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STATE COLLEGE RECORD

Vol. 38 APRIL, 1939 No. 8

The North Carolina State College
of
Agriculture and Engineering
of
THE UNIVERSITY OF NORTH CAROLINA

THE CATALOG
1938-1939

Announcements for the Session 1939-1940

STATE COLLEGE STATION
RALEIGH

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COLLEGE CALENDAR

First Term

1939	
Sept. 7, Thursday, 3 P. M.	College Faculty Meeting
Sept. 8, Friday	Registration of Freshmen
Sept. 11, 12, Monday and Tuesday	Admission with advanced standing
Sept. 13, Wednesday	*Registration of Soph., Jr., Sr., and Grad. Students
Sept. 14, Thursday	Class work begins
Sept. 23, Saturday, 12 Noon	Last day, first term, for registration or change in registration
Oct. 3, Tuesday	Observance of the Fiftieth Anniversary of the College
Oct. 23, Monday	Mid-term reports due
Nov. 4, Saturday	Final date for dropping a course without a grade of F
Nov. 11, Saturday (not a holiday)	Observance of Armistice Day
Nov. 30, Thursday	Thanksgiving holiday
Dec. 13, Wednesday	First term ends

Second Term

1940	
Jan. 2, Tuesday	*Second term registration of all students
Jan. 3, Wednesday	Class work begins
Jan. 6, Saturday, 12 Noon	Last day in the second term for registration or for changes in registration
Feb. 5, Monday	Mid-term reports due
Feb. 14, Wednesday	Final date for dropping a course without a grade of F
March 14, Thursday	Second term ends

Third Term

March 19, Tuesday	*Third term registration of all students
March 20, Wednesday	Class work begins
March 25, Monday	Last day in the third term for registration or for changes in registration
April 22, Monday	Mid-term reports due
May 1, Wednesday	Final date for dropping a course without a grade of F
May 2, Thursday (not a holiday)	Observance of Scholarship Day
May 31, Friday	Third term ends
June 2, 3, Sunday and Monday	Commencement Exercises

Summer School

June 10, Monday	*Registration for Summer School
June 11, Tuesday	Class work begins
June 11, Tuesday	Final date for registration for credit
July 19, Friday	Summer term ends

Final examinations are held on the five recitation days preceding the end of each term.

* An extra fee is charged for registration after the day designated for registration.

1939

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MONROE EVANS GARDNER, *Professor of Horticulture.*
B.S., Virginia Polytechnic Institute.

IRVIN O. GARODNICK, *Instructor in Modern Languages.*
B.S., M.S., N. C. State College.

KARL CLAUDE GARRISON, *Professor of Psychology.*
B.S., Peabody College; M.S., University of North Carolina; Ph.D., Peabody College.

HERMAN CHRISTIAN GAUGER, *Instructor in Poultry Science.*
B.S., M.S., N. C. State College.

WILFRED GEORGE GEILE, *Professor of Structural Engineering.*
Ph.B. in Civil Engineering, Yale University.

GEORGE WALLACE GILES, *Assistant Professor of Agricultural Engineering.*
B.S., University of Nebraska; M.S., University of Missouri.

KARL B. GLENN, *Assistant Professor of Electrical Engineering.*
B.E., M.S., N. C. State College.

RICHARD ELLIOTT GREAVES, *Assistant Professor of Poultry Science.*
B.S., Wake Forest College; B.S., N. C. State College.

ARTHUR FREDERICK GREAVES-WALKER, *Professor of Ceramic Engineering.*
Cer.E., Ohio State University; D.Sc., Alfred University.

RALPH WALDO GREEN, *Associate Professor of Marketing.*
B.S., Cornell University; M.S., N. C. State College.

ROBERT EDWARD LEE GREENE, *Acting Assistant Professor of Agricultural Economics.*
B.S., M.S., North Carolina State College.

ALBERT HARVEY GRIMSHAW, *Professor of Textile Chemistry and Dyeing.*
Graduate of the New Bedford Textile School; B.S., M.S., N. C. State College.

CLAUDE DELBERT GRINNELLS, *Associate Professor of Veterinary Science.*
B.S., University of Minnesota; D.V.M., Cornell University; M.S., University of Minnesota.

FRANK FARRIER GROSECLOSE, *Associate Professor of Mechanical Engineering.*
B.S. in M.E., M.S. in M.E., Virginia Polytechnic Institute.

FREDERICK MORGAN HAIG, *Associate Professor of Animal Husbandry and Dairying.*
B.S., University of Maryland; M.S., N. C. State College.

REINARD HARKEMA, *Instructor in Zoology.*
A.B., Calvin College; Ph.D., Duke University.

THOMAS PERRIN HARRISON, *Professor of English.*
B.S., Citadel; Ph.D., Johns Hopkins University; LL.D., Citadel.

THOMAS ROY HART, *Professor of Weaving and Designing.*
B.S., T.E., M.S., N. C. State College.

LODWICK CHARLES HARTLEY, *Associate Professor of English.*
B.A., Furman University; M.A., Columbia University; Ph.D., Princeton University.

ARTHUR COURTNEY HAYES, *Instructor in Textile Chemistry and Dyeing.*
Ph.B., Brown University; M.S., N. C. State College.

CHARLES McGEE HECK, *Professor of Physics.*
A.B., Wake Forest College; M.A., Columbia University.

WILLIAM NORWOOD HICKS, *Associate Professor of Ethics and Religion.*
B.E., N. C. State College; A.B., Duke University; M.A., Oberlin College; M.S., N. C. State College.

JOHN THOMAS HILTON, *Professor of Yarn Manufacture.*
Diploma Bradford Durfee Textile School; B.S., M.S., N. C. State College.

LAWRENCE EARLE HINKLE, *Professor of Modern Languages.*
B.A., University of Colorado; M.A., Columbia University; D.S.es L., Dijon.

ELMER GEORGE HOEFER, *Professor of Mechanical Engineering.*
B.S. in M.E., M.E., University of Wisconsin.

JULIUS VALENTINE HOFMANN, *Professor of Forestry.*
B.S.F., M.F., Ph.D., University of Minnesota.

EARL HENRY HOSTETLER, *Professor of Animal Husbandry.*
B.S. in Agr., Kansas State Agricultural College; M.Agr., M.S., N. C. State College.

FRANKLIN CARLISLE JOHNSON, *Instructor in Chemical Engineering.*
B.S., North Carolina State College; M.S., Massachusetts Institute of Technology.

THEODORE SEDGWICK JOHNSON, *Professor of Industry.*
B.S., Denison University; C.E., Ohio State University; M.S., Denison University.

ARTHUR DAVE JONES, *Assistant Professor of Chemistry.*
A.B., A.M., University of Cincinnati.

ROBERT EDWARD JONES, *Assistant Professor of Military Science and Tactics.*
Major, Infantry, U. S. Army; Graduate, Infantry School, Fort Benning, Ga.

WALTER EDWARD JORDAN, *Associate Professor of Chemistry.*
B.S., M.A., Wake Forest College; M.S., N. C. State College.

LEROY MONROE KEEVER, *Assistant Professor of Electrical Engineering.*
B.E., M.S., N. C. State College.

WILLIAM PORTER KELLAM, *Librarian.*
A.B., A.M., Duke University; A.B. in L.S., Emory University.

ARTHUR I. LADU, *Professor of English.*
A.B., Syracuse University; M.A., Ph.D., University of North Carolina.

CLAUDE MILTON LAMBE, *Instructor in Civil Engineering.*
B.E., N. C. State College.

FORREST WESLEY LANCASTER, *Assistant Professor of Physics.*
B.S., Ch.E., Purdue University.

GERALD LANGFORD, *Instructor in English.*
B.A., M.A., University of Virginia.

BRYON ELMER LAUER, *Associate Professor of Chemical Engineering.*
B.S. in Ch.E., Oregon State College; M.S. in Ch.E., Ph.D., University of Minnesota.

MARC C. LEAGER, *Professor of Statistics and Accounting.*
B.S., M.S., University of Minnesota; Ph.D., Columbia University.

JOHN EMERY LEAR, *Professor of Electrical Engineering.*
B.S. in E.E., Virginia Polytechnic Institute; E.E., Texas A. & M. College.

FRANK ADOLPH LEE, JR., *Assistant Professor of Mathematics.*
A.B., Randolph Macon College; M.A., University of Virginia.

SAMUEL GEORGE LEHMAN, *Professor of Plant Pathology.*
B.S. in Ed., Ohio University; M.S., N. C. State College; Ph.D., Washington University.

JACK LEVINE, *Assistant Professor of Mathematics.*
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JOHN GARY LEWIS, *Assistant Professor in Textile.*
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DAVID ALEXANDER LOCKMILLER, *Associate Professor of History and Political Science.*
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JAMES FULTON LUTZ, *Associate Professor of Soils.*
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FRANK HALLAM LYELL, *Instructor in English.*
A.B., University of Virginia; M.A., Columbia University; Ph.D., Princeton University.

ROBERT JAMES MADDISON, *Foreman of Foundry and Forge.*
B.S. in M.E., Newark College of Engineering.

CARROLL LAMB MANN, *Professor of Civil Engineering.*
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B.S., M.S., North Dakota State College; Ph.D., Duke University.

WILLIAM MCGHEE, *Instructor in Psychology.*
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HERMAN RUSSELL MCLAWHORN, JR., *Instructor in Architectural Engineering.*
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WILLIAM DYKSTRA MILLER, *Associate Professor of Forestry.*
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THEODORE BERTIS MITCHELL, *Professor of Zoology.*
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THOMAS LEWIS NASH, *Instructor in Mechanical Engineering.*
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THOMAS NELSON, *Dean of the Textile School.*
D.Sc., N. C. State College.

EDWIN HUGH PAGET, *Associate Professor of English.*
B.L., Northwestern; M.A., University of Pittsburgh.

CHARLES BENJAMIN PARK, *Instructor Emeritus in Machine Shop.*

HUBERT VERN PARK, *Instructor in Mathematics.*
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JOHN MASON PARKER, III, *Instructor in Geology.*
A.B., A.M., Ph.D., Cornell University.

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JOSHUA PLUMMER PILLSBURY, *Professor of Horticulture.*
B.S., Pennsylvania State College.

ROBERT FRANKLIN POOLE, *Professor of Plant Pathology.*
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GLENN ORVICE RANDALL, *Associate Professor of Horticulture.*
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B.S., Tufts College; A.M., Columbia University.

* Resigned.
* On leave.

WALLACE CARL RIDDICK, *Dean Emeritus of the School of Engineering and Professor of Hydraulics.*
A.B., University of North Carolina; C.E., LL.D., Lehigh University; LL.D., Wake Forest College.

JACKSON ASHCRAFT RIGNEY, *Instructor in Agronomy.*
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MACON ROGERS ROWLAND, *Instructor in Mechanical Engineering.*
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WALTER EUGENE SELKINGHAUS, *Instructor in Mechanical Engineering.*
B.S., Newark College of Engineering.

RAYMOND ROLLINS SERMON, *Professor of Physical Education.*
B.P.E., Springfield College of Physical Education; B.E., D.O., Kirksville School of Osteopathy.

HOWARD BURTON SHAW, *Professor of Industrial Engineering.*
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CLARENCE B. SHULENBERGER, *Associate Professor of Accounting.*
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*ROSS EDWARD SHUMAKER, *Professor of Architectural Engineering.*
B.Arch., Ohio State University.

IVAN VAUGHAN DETWEILER SHUNK, *Associate Professor of Botany.*
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WILLIAM ERNEST SINGER, *Instructor in Chemistry.*
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* On leave.

GEORGE KELLOGG SLOCUM, *Assistant Professor of Forestry.*
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GEORGE WALLACE SMITH, *Professor of Engineering Mechanics.*
B.S.E.E., University of North Carolina; M.S.E. in C.E., D.Sc., University of Michigan.

*GLENN R. SMITH, *Assistant Professor of Agricultural Economics.*
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ROSS OLIVER STEVENS, *Associate Professor of Zoology and Entomology.*
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ROBERT LEGRANDE STONE, *Instructor in Ceramic Engineering.*
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Ph.D., Johns Hopkins University.

CLARENCE DALTON SWAFFAR, *Instructor in Animal Husbandry.*
B.S., Oklahoma A. and M. College.

DAVID BOYD THOMAS, *Instructor in Mathematics.*
B.S., M.S., N. C. State College.

HARRY TUCKER, *Professor of Highway Engineering and Director of the Engineering Experiment Station.*
B.A., B.S., C.E., Washington and Lee University.

*FRANK BROWN TURNER, *Assistant Professor in Mechanical Drawing.*
B.S., M.S., N. C. State College.

BLAKE RAGSDALE VAN LEER, *Dean of the School of Engineering.*
B.S., in E.E., M.E., Purdue University; M.S., University of California.

WILLIAM GARDNER VAN NOTE, *Assistant Professor of Chemical Engineering.*
Ch.E., Rensselaer Polytechnic Institute; M.S., University of Vermont.

LILLIAN LEE VAUGHAN, *Professor of Mechanical Engineering.*
B.E., N. C. State College; M.E., Columbia University.

EDMUND M. WALLER, *Assistant Professor of Physical Education. Freshman Football Coach.*
A.B., Vanderbilt University, M.A., Peabody College.

ROBERT SULLIVAN WARREN, *Assistant Professor of Physical Education and Assistant Coach of Football.*
D.O., American School of Osteopathy; B.S., N. C. State College.

DAVID STATHEM WEAVER, *Professor of Agricultural Engineering.*
B.S., Ohio State University; M.S., N. C. State College.

JAMES GRAY WEAVER, *Assistant Professor of Horticulture.*
B.S., M.S., N. C. State College.

* On leave.

BERTRAM WHITTIER WELLS, *Professor of Botany.*
A.B., M.A., Ohio State University; Ph.D., University of Chicago.

FRED BARNETT WHEELER, *Professor of Practical Mechanics and Superintendent of Shops.*
B.E., M.E., N. C. State College.

LARRY ALSTON WHITFORD, *Assistant Professor of Botany.*
B.S., M.S., N. C. State College.

DAN BRIDGER WICKER, *Associate Professor of Chemical Engineering.*
A.B., Elon College; B.S., N. C. State College; M.S., Massachusetts Institute of Technology; Ph.D., Institute of Paper Chemistry.

CHARLES BURGESS WILLIAMS, *Professor of Agronomy.*
B.S., M.S., N. C. State College.

HARVEY PAGE WILLIAMS, *Associate Professor of Mathematics.*
B.A., William and Mary College; M.A., Duke University.

LEON FRANKLIN WILLIAMS, *Professor of Organic Chemistry.*
A.B., A.M., Trinity College; Ph.D., Johns Hopkins University.

NORWOOD WADE WILLIAMS, *Assistant Professor of Poultry.*
B.S., M.S., N. C. State College.

ARTHUR JOHN WILSON, *Professor of Analytical Chemistry.*
B.S., M.S., N. C. State College; Ph.D., Cornell University.

THOMAS LESLIE WILSON, *Assistant Professor of English.*
A.B., Catawba College; A.M ,Wofford College.

EDWIN WEEMS WINKLER, *Instructor in Electrical Engineering.*
S.B., Montana State College; M.S., University of North Carolina.

SANFORD RICHARD WINSTON, *Professor of Sociology.*
B.A., Western Reserve University; Ph.D., University of Minnesota.

LOWELL S. WINTON, *Assistant Professor of Mathematics.*
B.S., Grove City College; M.A., Oberlin College; Ph.D., Duke University.

LENTHALL WYMAN, *Professor of Forestry.*
A.B., M.F., Harvard University.

WILLARD KENDALL WYNN, *Assistant Professor of English.*
A.B., Wofford College; M.A., Emory University; M.A., Columbia University.

ROBERT BAKER WYNNE, *Instructor in English and Public Speaking.*
A.B., A.M., William and Mary College.

Teaching Fellows, 1938-1939

J. J. Amero, Ceramic Engineering
P. T. Angell, Mechanical Engineering
S. E. Bagley, Jr., Textile
T. A. Bell, Agricultural Chemistry
W. B. Callihan, Agricultural Education
B. S. Clapp, Industrial Arts Education
R. E. Clegg, Agricultural Chemistry
L. R. Crane, Electrical Engineering
J. C. Darsie, Wildlife Management
C. L. Davis, Plant Breeding
J. C. Frink, Plant Breeding
H. R. Garriss, Plant Pathology
D'A. R. George, Geological Engineering
R. P. Harris, Chemical Engineering
C. H. Hill, Entomology
J. S. Holloman, Animal Industry
V. B. Holland, Agricultural Chemistry
Dan Lipschutz, Civil Engineering
J. P. McMenamin, Ecology
H. B. Malone, Textile
H. S. Morgan, Jr., Electrical Engineering
M. A. Moseley, Jr., Agricultural Chemistry
T. S. Quay, Entomology
W. B. Rankin, Agricultural Chemistry
M. E. Ray, Civil Engineering
G. M. Schroder, Agricultural Chemistry
C. B. Shimer, Plant Physiology
R. I. Simpkins, Civil Engineering
E. P. Singsen, Poultry
R. W. Stephenson, Chemical Engineering
W. N. Suominen, Civil Engineering
S. M. Watson, Chemical Engineering
J.W. Webster, Plant Breeding
J. E. Yates, Chemical Engineering

Research Fellows, 1938-1939

Jess Elson, Soils
M. M. Evans, Plant Pathology
James Ferger, Plant Pathology
G. R. Fowler, Plant Pathology
L. N. Hall, Plant Breeding
L. W. Herrick, Poultry
R. W. Leamer, Soils
O. P. Owens, Plant Pathology
Mrs. M. S. Richmond, Agricultural Chemistry
Milton Salomon, Soils
F. R. Speer, Soil Fertility
V. S. Watson, Jr., Plant Breeding

Student Assistants

English
Charles Cumston Chadbourn, Jr.
William Lester Carter
Bruce Andrew Hildebrand
Everet Foy Smith
Edgar Duncan Stowell

Textile
Eugene Allen Dees
Walter Lee Fanning
George Verner Hanna, Jr.
Edward Suther Johnson
Robert Beam Wood

II. GENERAL INFORMATION

The College

Establishment.—The North Carolina State College of Agriculture and Engineering is one of the Land-Grant Colleges established under the provisions of the Morrill Act, passed by the Congress of the United States, June 2, 1862. The first session of the College was that of 1889-1890. Prior to that date, the funds received by the State under the Land-Grant Act had been used by the University of North Carolina, at Chapel Hill.

The name, The North Carolina College of Agriculture and Mechanic Arts, used in the establishment of the College, was changed by the General Assembly—the Legislature of the State—in 1917 to its present form.

In its session of 1931, the General Assembly passed an Act, of which the following is the first section: "That the University of North Carolina, the North Carolina State College of Agriculture and Engineering, and the North Carolina College for Women are hereby consolidated and merged into 'The University of North Carolina'."

This Act placed the three institutions under one Board of Trustees and one President, the separate affairs of each institution being in charge of its own Administrative Dean. The effect of the Act, by correcting unnecessary duplication and focalizing the work of each of its members, has tended to create a strong, unified State University.

Location.—State College Campus of thirty acres lies within the limits of Raleigh, a mile and a quarter west of the State Capitol, on United States Highway, Route 1. Adjoining the Campus westward, occupying four hundred fifty-six additional acres, are the College orchards, gardens, poultry yards, and the Central State Experiment Farms.

A mile from the Campus, still farther westward, the College has recently acquired a tract of thirteen hundred acres, which is already being developed for experiment and research, and for demonstration, in Animal Husbandry. In the plans, special provision is being made for work in Dairy Industry in all its branches. Ample funds are available for suitable buildings and laboratories.

The portion of this tract not at present adapted for its special use will be taken in charge for development by the Forestry Department of the College.

Organization.—The organization of State College has as its objectives Campus Teaching, Extension Teaching, and Research.

Campus Teaching occupies the School of Agriculture and Forestry, the School of Engineering, the Textile School; the Division of Teacher Training, the Graduate Division, the Basic Division, and the Summer Session. The Schools and the Basic Division are organized for teaching by Departments. The details of the organization, the equipment, and the work of each School, and of each Department are given under the various headings in the later

pages of this Catalog. The work of the Summer Session is set forth in a special issue of STATE COLLEGE RECORD published each year in December, a copy of which is sent on request.

The Division of Military Training, including as the Reserve Officers Training Corps, students of all classes in all Schools, is placed immediately under the College Administration.

Extension Teaching is directed under the Division of College Extension. The work is closely coördinated with the work in the regular Departments of the College. In certain short courses, most of them in Agriculture and in Engineering, Extension overlaps with Campus Teaching. The whole State is covered in the activities of the Agricultural Extension Service.

Research is conducted, by individuals or by Departments, very generally at State College. Specially organized work is done through the Agricultural Experiment Station, the Engineering Experiment Station, and the Textile Research Department.

The Campus.—The Campus of State College presents an agreeably rolling terrain with adequate space west and south for expansion. Located on the eastern edge of the Piedmont Region of the State, within twenty-five miles of the Coastal Plain, opportunity is afforded for a pleasing variety of trees and shrubs in the landscaping. Fortunately, in the early years of the College a long-range plan for growth was made. This plan is now being intelligently followed.

Under the sections of the Catalog devoted to Schools and their Departments and to Divisions, are placed descriptions of buildings, laboratories, and facilities of each of these.

General Service Buildings.—Holladay Hall, named for Colonel Alexander Quarles Holladay, first President of the College, 1889-1899, contains the general administrative offices of the College, and the offices and classrooms of the Military Division and of the Division of Teacher Training.

The D. H. Hill Library, named for Doctor Daniel Harvey Hill, President of the College, 1908-1916, was dedicated in 1926. It contains now about 55,000 volumes, exclusive of Government documents, and pamphlets.

The Y. M. C. A. building, the erection of which was made possible by a donation from the Rockefeller Foundation, serves the religious and social life of the College.

The Dining Hall, an H-shaped building, with kitchens, storage rooms, pantries, and refrigerators and other mechanical devices in the center and basement, has at each side, front and rear, a spacious dining hall. The service is on the cafeteria plan.

The Frank Thompson Gymnasium, named in honor of Frank Martin Thompson, distinguished athlete, graduate of State College, Class of 1910, killed in service during the World War, is thoroughly equipped and modern in all its appointments.

The Infirmary, recently enlarged and renovated, is a model of a small, special hospital.

Pullen Hall, named in honor of R. Stanhope Pullen, donor of first sixty acres of the College land, has classrooms on the first and basement floors, on the second floor, the College auditorium.

The Power Plant, recently erected, centrally located, furnishes heat, electric power, and hot water to all buildings on the Campus using these services.

Eight Dormitories now in use accommodate twelve hundred thirty-four students, two in each room; four under construction and a fifth projected, to be completed by September, 1939, will house six hundred thirty-four. Other students will room, as at present, in homes in the vicinity of the Campus and in fraternity houses. Full information in regard to dormitories is sent by the Registrar to applicants accepted for admission to the College, or by the Superintendent of Dormitories.

INFORMATION FOR APPLICANTS

I. Admission

1. The first step toward admission to State College is to get from the Registrar, who is to be addressed at State College Station, Raleigh, a certificate blank. After the blank has been filled out and signed by the principal or the superintendent of the high school or other preparatory school, the certificate is sent to the Registrar for his decision on admission, notice of which will be given promptly.

The certificate must contain a statement from the school last attended of the good moral character of the applicant.

2. Undergraduate students may be admitted as regular or special.

(1) A regular student is one who is registered in a four-year curriculum.

(2) Women may be admitted as regular students provided they present a minimum of forty-eight semester-hours credit of advanced college standing and register in one of the regular curricula.

(3) A special student is a person of mature age already engaged in some vocation in which instruction is desired. Such person may, upon presenting a satisfactory record of education and upon recommendation of the Dean of the School concerned, be admitted without the usual entrance requirements.

Special students are not eligible for a degree, nor does work done as a special student have value for credit toward a degree. A special student cannot represent the College in any intercollegiate contest nor become a member of a fraternity.

3. (1) Sixteen years is the minimum age for admission.

(2) Fifteen units of credit, specified and elective as indicated below, are required for admission to the freshman class of four-year courses.

(3) A unit is allowed for a subject pursued for a year, five periods a week, each period being at least forty minutes, and successfully passed in a high school accredited by the North Carolina State Department of Public Instruction or other preparatory school accredited by competent authority.

(4) Applicants graduated by non-accredited four-year high schools may be admitted by passing successfully an entrance examination such as that prepared by the Examination Committee of the North Carolina College Conference.

(5) All freshmen, immediately after registration, are given a placement test in English, by the results of which they enter A, B, or C divisions in this subject.

3. Subjects required for admission.

(1) Specified Subjects.—

	Units of Credit
English: Grammar, Composition, Literature	3
History: United States or equivalent	1
Algebra to Quadratics	1
Algebra, Quadratics through Progressions	.5
Plane Geometry	1
Solid Geometry	.5
Any Science listed under Elective Subjects	1

A student not offering for credit History of the United States is required to take the subject or Government of the United States in his College course.

Solid Geometry is required only in the School of Engineering. Not having had it, a student must take a special course to get this credit.

(2) Elective Subjects.—The figure following each subject represents the maximum number of credits which will be accepted, including those in required subjects. Fewer than that number may be accepted.

Science—	Units of Credit	History and Social Science—	Units of Credit
Biology	1	United States or Equivalent	1
Botany	1	English	1
Chemistry	1	General	1
Commercial Geography	.5	Medieval and Modern	1
General Science	1	Ancient	1
Physics	1	North Carolina	.5
Physiology and Hygiene	1	Civics	1
Physical Geography	1	Sociology	1
Zoölogy	1	Economics	1
Language—		Mathematics—	
English	4	Algebra	2.5
French	2	Business Arithmetic	1
German	2	Plane Geometry	1
Latin	4	Solid Geometry	.5
Spanish	2	Trigonometry	.5

Miscellaneous Subjects (a total of not over 4 credits allowed)

Agriculture	4	Drawing	1
Bookkeeping	1	Mechanic Arts	2
Stenography and Typewriting	1	Mill Practice	1

Any other high school subject 1

II. Expenses

1. The total College expenses of a student resident of North Carolina need not for the regular College year exceed $450, for a non-resident of this State, $620. These amounts include the cost of room and board, heat and lights, tuition, fees and deposits, books, drawing instruments, laundry, and necessary incidentals. They do not include clothing, pocket money, or other incidentals.

2. Nonresidents of North Carolina pay an additional matriculation fee of $170, payable half on registering in September, half on registering in January. A student under 21 years of age once entering as a non-resident will not be permitted to claim residence unless his parents or guardians become bona fide residents of North Carolina and submit satisfactory affidavits as evidence. A student who is over 21 years of age on his first matriculation in the College, to obtain exemption of the non-resident fee, must present proof of his having been a bona fide resident of North Carolina at least one year before the date of registration.

3. The State law requires the prepayment of College accounts: the time and the amount of payments must conform to this law. For the convenience of students, charges for tuition and fees may be made in two installments,

one in September, one in January. Six per cent is charged on payments deferred beyond these dates.

4. Applications for credit must be made to Mr. A. F. Bowen, Treasurer of the College, prior to registration day. Applications made later, if granted, will require a special fee of $5 and possibly also the fee for late registration.

5. For each failure to meet deferred payments as scheduled, a fee of $5 is charged.

6. Tuition and fees for residents of North Carolina as regular undergraduates or as special students scheduled for twelve or more credit hours are as follows:

	September Payment	January Payment
Tuition	$40	$40
College Fees	37	37
Student-Activities Fee	4	4
Athletic Fee	8	7
Agricultural, and Agricultural-Education Students Fee	2	2
Engineering Students Fee		1
Military Deposit	10	

Note.—Tuition and Fees are subject to change by the Board of Trustees without advance notice.

7. Any part of the military deposit left after paying for lost or damaged equipment is returned.

8. Nonresidents of North Carolina pay $85 additional tuition in September and $85 additional in January.

9. Expenses include also the following:

	September	January
Room Rent, if not already paid	$16.50 to $27.00	$16.50 to $27.00
Books and Supplies	20.00 to 35.00	8.00
Drawing Equipment for those taking drawing	7.50 to 17.50	
Military Shoes and Supplies	6.50	

10. Room rent for the rest of the College year is the only regular payment at the March registration.

11. For graduate students and for special students taking fewer than twelve credit hours, tuition and fees are:

(1) For each credit hour per term, $3, not including student-activities or athletic fees, which are optional.

(2) Matriculation fee, $5, payable only once.

12. College fees include those for registration, for hospital and medical attention, for library and lectures, for laboratories and classrooms, and for physical education.

13. Student-activities fees include those for student government, student publications, and general student activities.

14. Freshmen, unless living at home with their parents are required to room in specified College dormitories.

15. Reservation of a room and the first payment of rent must be made before August 15 to obtain the most desirable room available. A reservation may be canceled and the payment therefore refunded upon notice before September 1, not later. Information about rooms may be had by writing Mr. T. T. Wellons, Superintendent of Dormitories.

16. Dormitory rooms have necessary furniture, but each student must bring his own blankets, bed linen, and towels.

17. Board at the College Cafeteria may be paid in cash for each meal, or in tickets bought at ten per cent discount from the cash price.

18. The Self-Help Secretary, N. B. Watts, will, upon request, write of possible employment to those wishing to earn, while in College, money to help in paying expenses.

19. A refund of the amount paid the College, less the registration fee and a reasonable charge for lodging and services, is made to a student withdrawing within ten days from the date of registration; on withdrawal later, no refund will be made except of the military deposit.

III. Registration

1. A program of exercises during the first week is given each applicant for admission to the freshman class on his arrival upon the Campus.

2. The Certificate of Admission approved beforehand by the Registrar for the School and the Department in which the applicant wishes to register must be ready for presentation.

3. The dates indicated in the College Calendar for the registration of freshmen, of those applying for advanced credit, and of sophomores, juniors, seniors, and graduate students must be strictly observed.

4. For registration after the scheduled date, an extra fee of $2 is required for the first day and $1 for each additional day until a maximum of $10 is reached. This rule does not apply to a first matriculation at State College.

5. Directions in detail for registration are furnished each student on entering the registration room, the Gymnasium.

6. The payment of College charges, stated above under Expenses is the first step in registration.

7. Advanced standing is allowed on work done in approved colleges upon presentation of a certificate or transcript, duly signed, to the Dean of the School concerned. However, at least one year in residence is required for a degree.

8. Vaccination against smallpox is required before admission unless the

applicant has been successfully vaccinated within two years preceding his registration.

9. Inoculation against typhoid fever, though not compulsory, is urgently suggested for those entering the College. Free inoculation is offered by the College to all students.

10. Admission to classes is permitted only after complete registration certified on the official card of the Registrar. All instructors will enforce this rule.

IV. Financial Aids and Scholarships

1. **The Self-Help Secretary** of the College Y. M. C. A. (see page 38) will assist those desiring employment to help pay expenses.

2. **A Student Loan Fund**, first established by the State College Alumni Association, amounting now to $34,000, renders assistance to needy students of talent and high character. The Fund includes the **Finley Loan Fund** of $1,000 (see below), the **Masonic Loan Fund**, $4,500, the **Frank M. Harper** Loan Fund, $200, and the Escheats Loan Fund of $15,000. Contributions have also been made by the **Sixth Masonic District** and by the **New Bern Masonic Theatre.**

At present, loans, restricted to juniors and seniors, are made at 6 per cent on good security. The fund being small and kept loaned out, new loans can be made only as old ones are repaid.

The Finley Loan Fund is a memorial of William Wilson Finley by the Southern Railway Company, of which Mr. Finley was, at the time of his death, president. It is designated for needy students in Agriculture.

3. **The John Gray Blount Scholarships** were endowed by Colonel W. B. Rodman, of Norfolk, Virginia, in memory of his great-grandfather. The maximum value of each of the two scholarships is $200.

4. **The Champion Paper and Fibre Company** provides a fund for a Fellowship to encourage graduate study and research in Chemical Engineering.

5. **The Holladay Scholarship** was established in 1936 by Mr. Randolph Holladay in honor of his father, Colonel Alexander Quarles Holladay, LL.D., first president of State College. This, a four-year scholarship, was duly awarded in August, 1936.

6. **The Syd Alexander Scholarship** was endowed by Mrs. Mary R. Alexander of Charlotte, North Carolina, in memory of her husband, the late Sydenham B. Alexander, alumnus and trustee of State College. The returns from the endowment—$5,000—are awarded to a student native and resident of Mecklenburg County, North Carolina, who is pursuing a course in the School of Textiles of State College.

7. **The Barrett Company**, Distributors of Arcadian American Nitrate of Soda, offer to 4-H Club members the following one-year scholarships:

(1) To the member with the most distinguished record with a Corn-Club project.
(2) To the member with the most distinguished record in Cotton-Club work.
(3) To the member with the best Tobacco-Club record.
(4) To the member with the best record in Horticulture.

8. **The North Carolina Cottonseed-Crushers Association** offer to 4-H Club members the following one-year scholarships:
(1) To the member making the best record in the Baby-Beef contest.
(2) To the member making the best record in a dairy project.
(3) To the member making the best Pig-Club record.

9. (1) **The Chilean Nitrate Educational Bureau** offers a four-year scholarship to the 4-H Club member in North Carolina making the best record for three or more years in 4-H Club work.

(2) **The Chilean Nitrate Educational Bureau** also offers a hundred scholarships of $5 each: one to the most distinguished Club boy from each of the hundred counties of North Carolina attending the 4-H Summer Short Course at State College.

10. **Graduate Fellowships** are offered each year by State College, during the current year, thirty-four teaching, twelve research fellowships. As the number of these scholarships is limited, application should be made early to the Head of the Department concerned.

11. As need arises, assistants are selected from upperclass or graduate students—during the current year, five each in English and in Textile.

STUDENT ACTIVITIES

Student Government

Student Government, in accordance with an agreement between the students and the Board of Trustees of the College, undertakes "to handle all matters of student conduct, honor, and general student interest, and to promote in Campus life self-control, personal responsibility, and loyalty to the College and the student body."

The Student Council, the legislative-executive body for Student Government, is composed of one senior, one junior, and one sophomore from each of the Schools—Agriculture and Forestry, Engineering, and Textile—and one member chosen at large from the freshman class at the beginning of the second term.

For guidance in its operation, the **Constitution and Bylaws for Student Government** has been adopted.

Student Publications

The Publications Board is composed of the editors and business managers of all student publications, the president and the past president of the junior

class, the president of the Student Council, and five faculty members. The Board seeks to promote the interests of the College and of the publications, to insure coöperation between the publications, and to hold the loyal support of the faculty, the students, and the public.

The Technician, the student newspaper, is delivered to each student's mail box every Friday morning of the regular College session. The charge for the paper is included in the student's publications fee.

The Agromeck is the official annual published at the end of each scholastic year of the College. A copy of **The Agromeck** is also paid for by each student in his publications fee.

The Wataugan, issued twice each term, is "a strictly humor magazine." The student's publications fee covers his charge for it.

The Agriculturist, a monthly magazine in its field, was begun by the activities of the Alpha Zeta fraternity and the "Ag" Club. All students of the School of Agriculture and Forestry are concerned in this enterprise.

The Southern Engineer, the organ of the School of Engineering, is managed by the Engineers' Council. They plan to issue four numbers during the regular College session.

Pi-ne-tum is the annual of the Division of Forestry. Its contents constitute a record of persons, specially the graduating class, and of events of the year interesting to students of the Division and their friends.

Clubs and Societies

All clubs and societies endeavor to bring together students, several including members of the faculty, with the same interests or professional objective in order to cultivate close personal relations and fellowship. Their chief purpose is to inculcate high professional consciousness and esprit de corps; and, with a view toward the accomplishment of these ends, they afford to members an opportunity to hear and to participate in discussions of professional problems and themselves to present papers on current technical topics.

The Agricultural Club besides the usual activities, sponsors the Agricultural Fair and an annual "Barn-Warming."

The Forestry Club, having the usual program through the year, publishes its own annual, **Pi-ne-tum**.

La Société des Beaux Arts includes students in Architectural Engineering and those in Landscape Architecture.

The Agricultural Engineering Club brings together students of this department to discuss all phases of their specialty.

The Agricultural Education Society devotes its attention to matters of interest to students who are preparing to become teachers of agriculture.

Student Chapters in Engineering at State College represent the following national organizations:

The American Ceramic Society
The American Institute of Chemical Engineers
The American Society of Civil Engineers
The Associated General Contractors of America
The American Institute of Electrical Engineers
The National Society for the Advancement of Management
The American Society of Mechanical Engineers
The Institute of Aeronautical Sciences

Theta Tau: National Professional Engineering Fraternity, Rho Chapter, at State College, has a membership exceeding two hundred.

The Engineers' Council, composed of three students and a professor from each Department of the School of Engineering, publishes quarterly **The Southern Engineer** and sponsors the Engineers' Fair and Exposition.

The Tompkins Textile Society endeavors to keep abreast of whatever affects the textile industry, state, national, or foreign. For this society, the event of the year is the Textile Style Show and Exposition.

The International Relations Club, including faculty and student members, seeks to arouse intelligent and active interest in national and foreign affairs.

The Monogram Club has as its purpose to develop the highest order of sportsmanship in all athletics.

State College Life-Saving Corps, affiliated with the Red Cross, is interested in ways to accomplish the worthy ends indicated by its name.

Honor Fraternities and Societies

Honor Fraternities and Societies strive to encourage and reward high attainment in scholarship and character, and to instill lofty professional ideals, with leadership in contribution to existing knowledge and in service as prime objectives. The following national fraternities and societies have chapters or other organizations at State College:

Alpha Zeta: Agricultural
Eta Kappa Nu: Electrical Engineering
Gamma Sigma Epsilon: Chemical
Kappa Phi Kappa: Teaching
Keramos: Ceramic Engineering
Lambda Gamma Delta: Agricultural Judging
Mu Beta Psi: Musical
Phi Eta Sigma: Freshman, Scholarship
Phi Kappa Phi: Scholarship; Character
Phi Psi: Textile
Pi Kappa Delta: Public Speaking
Sigma Pi Alpha: Language
Tau Beta Pi: Engineering
Upsilon Sigma Alpha: Army

Blue Key: Scholarship, Leadership, Student Activities
Scabbard and Blade: Military; Reserve Officers Training Corps

The following are organizations peculiar to State College:

The Golden Chain: Citizenship; Senior
The Order of St. Patrick: Engineering; Senior; Collegiate and Personal Distinction
The Order of 30 and 3: Leadership; Sophomore
The Pine Burr Society: Scholarship and Extracurricular Activity
Sigma Tau Sigma: Scholarship; Textile

Social Fraternities

Following are the national Greek-Letter Fraternities having chapters at State College. Each chapter has in the vicinity of the Campus its own house.

Alpha Gamma Rho
Alpha Kappa Pi
Alpha Lambda Tau
Delta Sigma Phi
Kappa Alpha
Kappa Sigma
Lambda Chi Alpha
Phi Kappa Tau
Pi Kappa Alpha
Pi Kappa Pi
Sigma Alpha Mu
Sigma Nu
Sigma Phi Epsilon
Sigma Pi
Theta Kappa Nu

The Interfraternity Council, composed of two representatives from each chapter, has as its purpose to advance the interests of North Carolina State College; to promote the general interests and welfare of the associated fraternities as a body; and to insure coöperation between them in their relations with the faculty, the student body, and the public in general.

FACULTY AND STUDENT ACTIVITIES

Medal and Prizes

1. **The Alpha Zeta Cup** is awarded to the sophomore in Agriculture who during his freshman year made the highest scholastic average.

2. **The General Alumni Association of the College** presents annually a trophy to the member of the graduating class who during his College course has most distinguished himself in athletics.

3. **The American Institute of Chemical Engineers** presents annually its award to the sophomore who during his freshman year made the highest scholastic record.

4. **The Associated General Contractors of America Prize** of a year's special training in construction in the field with pay, is awarded each year by the Carolina Branch of organization to the member of the graduating class in Construction Engineering who during his sophomore, junior, and senior years has made the highest scholastic record.

5. **The Elder P. D. Gold Citizenship Medal**, founded by the late C. W. Gold in memory of his father and continued by his son, C. W. Gold, Jr., of Greensboro, North Carolina, is awarded annually to the member of the graduating class who during his sophomore, junior, and senior years has most distinguished himself in Student Citizenship. The qualities determining the award —scholarship, student leadership, athletics, and public speaking—are to be attested by the College Registrar, the Student Council, the Faculty Athletic Committee, and a committee composed of the ranking junior officer in each of the college societies in which public speaking is practiced.

6. **The Moland-Drysdale Corporation Scholarship Cup**, presented by Mr. George N. Moland, of Hendersonville, North Carolina, President of the Corporation, is awarded annually to the freshman in Ceramic Engineering who during the two terms preceding Scholarship Day, has the highest scholastic record together with interest shown in the activities of the department.

7. **The J. C. Steele Scholarship Cup**, presented by J. C. Steele and Sons, of Statesville, North Carolina, to commemorate the establishment by Mr. Steele of the first plant for the manufacture in the South of ceramic machinery, is awarded annually to the student of the three upper classes in the Department of Ceramic Engineering who has made during the three terms preceding Scholarship Day the highest scholastic record. In making the award, personality and interest in the activities of the Department are considered.

8. **The Sigma Tau Sigma Cup** is awarded annually to the senior in Textiles who has the highest scholastic record.

9. **The Textile Colorist Medal** is awarded annually to the senior who presents the best thesis on some subject in Textile Chemistry and Dyeing.

10. **Phi Kappa Phi**, Honor Scholarship Society, awards each year a gold medal to the senior who as a junior, a silver medal to the junior who as a sophomore, and a bronze medal to the sophomore who as a freshman, made, respectively, the highest scholastic records.

Physical Education and Athletics

Aims.—In general, the Department aims are: (a) to promote a higher standard of physical fitness through "big muscle" activities; (b) to develop habits, knowledge, appreciation, and skills in desirable sports, and athletic and gymnastic procedures; (c) to develop the habit of safe recreative activities to be indulged in after graduation.

Organization.—The Department of Physical Education and Athletics is in the Basic Division of the College. The program of service has three sections: Physical Education, offered in various curricula, for which college credit is given; Intramural Activities, for every interested student in the College; Intercollegiate Athletics, representative of the College.

Control.—All activities of the Department are controlled by the College. Physical Education and Intramural Activities are under the supervision of

the Dean of the Basic Division. Intercollegiate athletic activities are under the supervision of the Athletic Council. The Head of the Department seeks balance and coördination in the work of the three sections. He delegates the work of the staff and sees that policies of the Department are carried out by them. To the Business Manager of Athletics is delegated the responsibility for business, financial, and other and all details connected with intercollegiate contests. The members of the staff are expected to give reasonable and capable assistance in any work of the Department insofar as it does not interfere with their main specialization. They are responsible to the Head of the Department for carrying out their duties.

Buildings and Fields.—The Department of Physical Education and Athletics is quartered in the Frank Thompson Gymnasium. It is among the largest and best-equipped gymnasia in the South. An attractive feature is a white-tiled swimming pool and natatorium, with modern filter and chlorinating systems. The new Field House, located at the south end of Riddick Stadium, is the headquarters of the football squad. Offices of the football-coaching staff are located in this building. Riddick Stadium, with new concrete bleachers, seats 15,000 spectators. Freshman Field, adjacent to the Gymnasium, serves many purposes, such as freshman football, intramural games, physical-training classes, and varsity baseball. The new quarter-mile track, with its 220-yard straightaways, is located just south of the Freshman Field. It has concrete stands seating about 3,000 spectators. "Red Diamond" and "1911 Parade Field" are available for intramural contests. The College has ten excellent clay tennis courts, with some additional contemplated. Upon the completion of the new dairy barns, the site of the old barns will be used as a varsity baseball field and an intramural field.

Activities.—The College requires all students to enroll in some type of physical activity for two years, or six full terms. The classes meet twice a week and one term credit is given for each term's work. All students are required to take a physical and a medical examination at the time of registering in college. Those who have subnormal conditions of any sort are placed on the recall list. Students may receive free medical advice at any time. All freshmen are required to take a course in Health Education which meets once a week for one term. This course consists of instruction in personal hygiene by members of the Physical Education Staff. A swimming requirement is also made for all freshmen, which must be met before graduation.

Intercollegiate Athletics.—North Carolina State College is a member of the Southern Conference, and subscribes to its rules of eligibility for all intercollegiate contests. The program consists of the organization and training of representative varsity and freshman teams in the following sports: football, basketball, baseball, track, cross-country, wrestling, boxing, swimming, tennis, golf, and rifle competition.

Intramural Athletics.—Activities are fostered and promoted in many lines of athletic sports for the student body. Meets, tournaments, and leagues are seasonally organized in twelve separate sports. Participation in these activities is purely voluntary; it does not receive College credit. Sports used in this program are correlated with those used in the required class work in Physical Education. Instruction in the sports is given in the class work and opportunity for competition is provided in the intramural program. Cups, shields, and trophies are awarded winners in these competitions.

Music

Christian D. Kutschinski, Director

Students with previous musical experience are encouraged to continue their musical activities in campus musical organizations for which they can qualify.

The 70-piece **R. O. T. C. band** and 50-piece **Drum and Bugle Corps** furnish martial music for all military parades by the R. O. T. C. Regiment.

The 80-piece **Red-Coat Band** plays and marches at all the football games, and at other campus and civic functions. Its membership comprises select R. O. T. C. and non-R. O. T. C. bandsmen, who receive training in the fundamentals of a marching band together with the R. O. T. C. Band, but devote some additional time in preparation for special programs.

The Drum and Bugle Corps, besides functioning as a separate unit, is also combined with the band on certain occasions, giving State College a marching musical unit of 130 men, clad in flashy new red-and-white uniforms, acquired in 1938 by contributions from students and faculty, and from interested citizens of Raleigh through the untiring efforts of The Junior Chamber of Commerce and the American Legion.

The Concert Band, composed of 60 of the most proficient musicians on the campus, concentrates on the study and performance of the finest in band-concert music. Its activities have greatly increased the cultural growth of those participating, and have done much toward increasing appreciation of music on the campus and in the community, in addition to providing wholesome entertainment.

Credit.—Juniors and seniors in the band who are not enrolled in the advanced course R. O. T. C. may obtain three term credits per year for Band when approved by the Director before registration.

The Concert Orchestra is augmented by a number of the best musicians in Raleigh to round out the instrumentation to that of symphonic balance. Besides preparing concert programs, the orchestra is divided into smaller units to provide music of a lighter nature for numerous College functions.

The Men's Glee Club rehearses three times a week, and alternates with the orchestra and bands in giving concerts throughout the year. It has proved to be a very popular extracurricular activity.

A Male Quartet and small **Chamber Music** ensembles are encouraged.

COLLEGE PUBLICATIONS

State College Record carries results of research and special studies by members of the Faculty and, in the April issue, the annual **Catalog** with announcements for the following year.

Agricultural Experiment Station publishes many bulletins of research conducted by the staff. These are sent on request free to anyone in the State.

Agricultural Extension Service issues circulars of practically useful information on various home and farm problems. A list of those available or any circular is sent on request free to citizens of the State.

The College publishes the results of experimental and research projects made by the **Engineering Experiment Station** and Engineering Departments of State College. Information concerning these publications may be obtained from the Director of the Station, Professor Harry Tucker.

HEALTH OF STUDENTS

The authorities of the College strive to protect the health of students in every way. Each student is given a thorough physical examination when he enters the College. If remedial defects are discovered, such as defective tonsils or eyes, he is advised to have these defects corrected. If the defect is such that it may be corrected by exercise, the student is placed in a special class under the supervision of the Physical Education Director in the Physical Education Department of the College.

The Infirmary, maintained by the College, has accommodations for thirty-five bed patients. There is a staff of five: the College Physician, a Supervising Nurse, an Assistant Nurse, a Night Nurse—all graduates of Class-A Hospitals—and a Laboratory and X-Ray Technician.

A modernly equipped First-Aid Department, and a Laboratory and X-Ray Department are valuable features of the Infirmary.

The College Physician visits the Infirmary regularly once daily and more often when necessary. The Infirmary is never closed. A graduate nurse is on duty day and night. Students have free access to the Infirmary at all times.

Parents or guardians will be notified immediately by the Dean of Students in case of accident or serious illness of their sons, and no surgical operation will be performed, except in cases of extreme emergency, without full consent of parents.

Please note: "The hospital and medical fee provides for students' hospital service, general medical treatment, and the services of the nurses.

"It does not provide for surgical operations nor private nursing; neither does it include the services of dentists, or any other specialist."

THE GENERAL ALUMNI ASSOCIATION

Alumni Organizations.—The purpose of this organization is to promote the interests of State College and to foster among its former students a sentiment of regard for one another, an attachment to their Alma Mater, and the ideals of service to their fellow men; to interest prospective college students in the kind of training given at State College and the advantages which young men who are graduates of schools of science and technology have in the fields of useful employment.

The annual business meeting of the General Alumni Association is held during the Commencement each year. Officers of the General Alumni Association, members of the Alumni Executive Committee, members of the Alumni Loyalty Fund Council, and alumni representatives on the Athletic Council are elected at the annual meeting.

Class reunions are held each year in connection with the annual meeting of the Association. These reunions are scheduled so that each class has a reunion the first year and subsequently, every five years after graduation.

State College Club.—Local Chapters of the General Alumni Association may be organized wherever there is sufficient interest to justify a chapter. At present, there are eighteen chapters in North Carolina and ten chapters outside the State. These organizations are called State College Clubs.

The Alumni Office.—Records of both graduates and non-graduates are kept by the Alumni Office. The master file includes information on all former students; other files are arranged geographically and by classes. Biographical files are also kept on each graduate.

The Alumni Office serves as a medium of communication between alumni and the College. The office is located on the main floor of Holladay Hall and is official headquarters for alumni when they visit the Campus.

The Alumni News.—The ALUMNI NEWS is published monthly except July, August, and September by the General Alumni Association. The purpose of this publication is to keep alumni in touch with the College and with each other. The magazine is edited by the College News Bureau and the Alumni Office. Special items of news addressed to the Alumni Secretary about alumni or about State College are solicited.

THE D. H. HILL LIBRARY

WILLIAM PORTER KELLAM, *Librarian.*
A.B., A.M., Duke University; A.B. in L.S., Emory University

HARLAN CRAIG BROWN, *Circulation.*
A.B., B.S. in L.S., University of Minnesota; A.M. in L.S., University of Michigan

CLYDE H. CANTRELL, *Periodicals.*
A.B., A.M., A.B. in L. S., University of North Carolina

MRS. C. B. CLEVENGER, *Reference Librarian.*
B.L.S., University of Illinois

Miss Christine Coffey, *Cataloger.*
A..B., University of North Carolina; A.B. in L.S., University of Michigan

Mrs. D. B. Thomas, *Assistant in Cataloging.*
A.B., Woman's College of the University of North Carolina; B.L.S., McGill University

Miss Anne Leach Turner, *Order Librarian.*
A.B., University of North Carolina; B.S. in L.S., Columbia University

Beginning.—The library dates from December, 1889, when $500 was appropriated for the purchase of books as the nucleus of a library. From 1889 to 1903, the library was housed on the second floor of the Administration Building. Upon the completion of Pullen Hall, larger quarters on the first floor of that building were occupied. The library remained in Pullen Hall until 1926, when it was moved into its present building.

Technical, First.—Realizing that experience in the use of books is an essential part of the training of agriculturist, engineer, industrialist, and scientist, the College is striving to build strong, well-balanced collections in the degree-giving Departments, supported by adequate material in supplementary fields. To this end, the library is planned primarily to supply the study and research needs of the staff and students of the College. Its facilities, however, are available to all residents of the State for reference; and books on agricultural, scientific and technical subjects which are not available from the North Carolina Library Commission may be borrowed by any citizen of North Carolina, the borrower paying the transportation charges.

Inclusive.—The library collection includes all books and periodicals belonging to the College. The total number of cataloged volumes is approximately 55,000, exclusive of a large number of publications of the Federal Government, the State Agricultural Experiment Stations, the State Extension Division, the Engineering Experiment Station, and the agricultural departments of many foreign countries. Slightly more than 700 periodicals and newspapers are received currently.

Facilities.—The library contains two reading rooms with a minimum seating capacity of 164. The larger room is used for study. It contains a collection of encyclopedias, dictionaries, standard reference books in the different fields of study, and the current issues of periodicals and newspapers. The Reference Desk, where all general and technical reference questions are answered, is conveniently located here. The smaller room, with a seating capacity of about twenty, is used for general reading. It is comfortably furnished and has a collection of the best fiction and non-fiction of general interest. As the purpose of this room is to promote reading for pleasure, studying is not permitted in it.

Instruction.—Through use of the Freshman English classes, elementary instruction in the use of the library is given during the fall quarter to all new students. This instruction includes lectures, and problems in the use of the card catalog, magazine indexes, and reference books. The librarian also offers a three-hour elective course in the use of the library during the winter and spring quarters.

YOUNG MEN'S CHRISTIAN ASSOCIATION

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Student Organizations

THE STUDENT CABINET
THE FRESHMAN CABINET

The objective of the Young Men's Christian Association is to contribute whatever is lacking in the total educational situation to make the principles and spirit of the Christian religion effective in personal, Campus, and social conduct.

The Y. M. C. A. Building is the social and religious center of the campus. On the first floor there are a recreation room, a guest room, a barber shop, and the Student Supply Store. There are a spacious lobby, an auditorium, a reception room, a dining room, the self-help office, and the service office on the second floor. The third floor provides space for the Faculty Club, Council of Student Government, a committee room, the Y. M. C. A. Cabinet Room, and the office of the General Secretary.

The student-employment service is directed by the Self-Help Secretary of the Association. Approximately five hundred and fifty students obtain part-time work through the Y. M. C. A.

Student and faculty organizations of all kinds use the facilities of the building for meetings and social gatherings, entertainments and lectures.

The Y. M. C. A. program, directed by the Student Cabinet, includes, with other features not mentioned, work for new students; organizing a Freshman Cabinet; planning socials with the students from nearby women's colleges; bringing to the campus eminent men to speak on such topics as men-and-women relationships and present-day international, racial, and economic questions; conducting an annual religious-emphasis week under the leadership of a Christian minister or layman who understands student life; sending delegates to state, regional, and national Christian Student Conferences; issuing annually State College Handbook, a compendium of extracurricular activities on the Campus, specially those of students, with personnel for the year.

III. SCHOOLS, DIVISIONS, AND DEPARTMENTS

THE BASIC DIVISION

BENJAMIN FRANKLIN BROWN, *Dean*

Organization.—Upon recommendation by President Graham, the Basic Division of the College was created by action of the Board of Trustees at its annual meeting on June 11, 1935. After considerable preliminary preparation, the organization of the Division became effective July 1, 1937, the first students being registered in the Division in September, 1938. For the first year it seemed advisable to include only the incoming freshmen. Beginning with the college year 1939-40 and thereafter, all freshmen and sophomores in the College will be registered in the Basic Division.

Administratively, the Basic Division includes the Departments of Economics, English, Ethics and Religion, History and Government, Modern Languages, Physical Education, and Sociology. The Heads of the Departments or representatives from them constitute the Administrative Board of the Division:

Economics: Associate Professor C. B. Shulenberger
English: Professor Carlyle Campbell
Ethics and Religion: Associate Professor W. N. Hicks
History and Government: Assistant Professor L. Walter Seegers
Modern Languages: Professor L. E. Hinkle
Physical Education: Professor J. F. Miller
Sociology: Professor Sanford Winston

The faculty is composed of the staff members of the Departments named above and in addition, the teachers of freshmen and sophomores from the Departments of Botany, Chemistry, Geology, Mathematics, Physics, Psychology, and Zoölogy.

Purposes.—Broadly speaking, the purposes of the Basic Division are (a) to provide the best possible preliminary training during the first two years of the student's college career so that he can during the last two years successfully pursue his professional education in agriculture and forestry, engineering, textiles, or vocational education; and (b) to provide effective guidance during the first two years, so that those students with well-chosen and fixed purposes can be well-advised in their educational careers and also so that those students who have made an unsatisfactory choice of curriculum or who have become uncertain of their careers, may receive helpful guidance and advice in finding themselves.

More specifically it is the function of the Basic Division:

First, to provide "two years of basic courses in the humanities, natural and exact sciences, and the social sciences as the foundation of the schools of agriculture and forestry, textiles and engineering;"[1]

[1] President Graham's *Report to the Board of Trustees*, June 11, 1935, page 11.

Second, "to provide in the curricula of the upper years of each technological school for a minimum of the more general cultural courses in the humanities, natural sciences, and social sciences."[2]

Student Guidance.—In carrying out its guidance program, the Basic Division avails itself of numerous tests which indicate the past achievements and the present rate of progress of its students. Upon entering, all freshmen take the placement tests in Mathematics and in English, and the psychological examination. In addition to these, the advisers have the use of mid-term reports on all students, the final examination record, the dormitory reports, and the record from the Dean of Students.

Each student is assigned to a technical adviser in the curriculum in which he is registered, to assist him in planning for his professional career. Students whose records come to indicate that they are not qualified for the curriculum they have chosen, or who become dissatisfied with their course, are assigned to guidance counselors for special assistance.

Special Testing Service is provided by the Department of Psychology in order to assist advisers and counselors in the guidance of students. In addition to the tests given to all freshmen already referred to, provisions are made for testing individual students who present special problems for study. The "testing service" rendered by the staff in Psychology administers tests of aptitudes, personality, interests, and educational achievement. Efforts are being made to provide a clinical approach to a study of the educational, vocational, and personality problems of individual students.

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[2] Ibid.

PROGRAMS OF STUDY

Programs of Study.—The Basic Division grants no degrees. It provides two years of fundamental training in preparation for the special training of the last two years in the other divisions of the college:

The School of Agriculture and Forestry
The Division of Teacher Training
The School of Engineering
The Textile School

Its programs of study are as follows:

1. **In Agriculture and Forestry.** (For complete curricula see pages 51-67).

(a) Leading to the degree of Bachelor of Science in Agriculture in one of the following fields—Agricultural Economics, Animal Production, Dairy Manufacturing, Entomology, Field Crops and Plant Breeding, Floriculture, Plant Pathology, Pomology, Poultry Science, Soils, and Vegetable Gardening.

Freshman Year

Courses	Credits *First Term*	*Second Term*	*Third Term*
Eng. 101, 102, 103	3	3	3
Chem. 101, 102, 103	4	4	4
Zool. 101	4	0	0
Bot. 102	0	4	0
Geol. 120	0	0	4
Hist. 101, 102, 103	3	3	3
Math. 100 abc	3	3	3
Mil. 101, 102, 103 or alt.	2	2	2
Phys. Ed. 101, 102, 103	1	1	1
	20	20	20

Sophomore Year

Courses	Credits *First Term*	*Second Term*	*Third Term*
Agr. Eng. 202	0	3	0
Soils, 201	0	0	4
Econ. 201, 202	3	3	0
Agr. Econ. 202	0	0	3
Phys. 115	5	0	0
Zool. 202 or Bot. 221	0	0	5
Zool. 102	0	4	0
Bot. 101	4	0	0
Chem. 221	0	4	0
A. H. 202	0	3	0
Poul. 201	3	0	0
For. 111	3	0	0
Hort. 203	0	0	3
F. C. 202	0	0	3
Mil. 201, 202, 203 or alt.	2	2	2
Phys. Ed. 201, 202, 203	1	1	1
	21	20	21

(b) Agricultural Chemistry,—leading to the degree of Bachelor of Science in Agriculture.

Freshman Year

Eng. 101, 102, 103	3	3	3
Chem. 101, 102, 103	4	4	4
Zool. 101	4	0	0
Bot. 102	0	4	0
Geol. 120	0	0	4
Hist. 101, 102, 103	3	3	3
Math. 100 abc	3	3	3
Mil. 101, 102, 103 or alt.	2	2	2
Phys. Ed. 101, 102, 103	1	1	1
	20	20	20

Sophomore Year

Bot. 101	4	0	0
Zool. 102	0	4	0
Zool. 202 or Bot. 221	0	0	5
Chem. 211, 212, 213	4	4	4
Soils, 201	4	0	0
Bot. 402	0	4	0
A. H. 202	0	0	3
Econ. 201, 202	3	3	0
Agr. Econ. 202	0	0	3
Mil. 201, 202, 203 or alt.	2	2	2
Phys. Ed. 201, 202, 203	1	1	1
	18	18	18

(c) Agricultural Engineering,—leading to the degree of Bachelor of Science in Agriculture.

Freshman Year				Sophomore Year			
Math. 101, 102, 103	6	6	6	Math. 201, 202, 203	4	4	4
Eng. 101, 102, 103	3	3	3	Eng. 211, 231	3	0	3
Chem. 101, 102, 103	4	4	4	Agr. Eng. 202	0	3	0
M. E. 105, 106, 107	3	3	3	Phys. 201, 202, 203	4	4	4
Mil. 101, 102, 103 or alt.	2	2	2	Geol. 220	3	0	0
Phys. Ed. 101, 102, 103	1	1	1	Agr. Eng. 212	0	3	0
				Soils, 201	0	0	4
	19	19	19	Hist. 101, 102, 103	3	3	3
				Mil. 201, 202, 203 or alt.	2	2	2
				Phys. Ed. 201, 202, 203	1	1	1
					20	20	21

Summer requirement:—C. E. s200.

(d) Forestry,—leading to the degree of Bachelor of Science in Forestry.

Freshman Year				Sophomore Year			
Eng. 101, 102, 103	3	3	3	Econ. 205	3	0	0
C. E. 101, 102, 103	1	1	1	Agr. Econ. 212	0	3	0
Bot. 101, 102, 203	4	4	3	Bot. 221	5	0	0
Math. 100 abc	3	3	3	Bot. 211, 213	3	0	3
Zool. 101, 102, 213	4	4	4	Chem. 101, 102, 103	4	4	4
For. 101, 102, 103	1	1	1	Geol. 120	0	4	4
Soc. 202	0	0	3	For. 202, 203	0	3	3
Mil. 101, 102, 103 or Soc. 101, 102, 103	2	2	2	C. E. 221, 222	0	3	3
Phys. Ed. 101, 102, 103	1	1	1	C. E. 225-224	0	1	1
				Psych. 200	0	0	3
	19	19	21	Mil. 201, 203, 203, or Hist. 104	2	2	2
				Phys. Ed. 201, 202, 203	1	1	1
					18	21	20

Summer Camp, see p. .....

(e) Landscape Architecture,—leading to the degree of Bachelor of Science in Agriculture.

Freshman Year				Sophomore Year			
Eng. 101, 102, 103	3	3	3	Eng. 211, 275	3	3	0
Math. 101, 102, 103	6	6	6	Bot. 221	0	0	5
Bot. 101, 102, 203	4	4	3	Hort. 301	3	0	0
M. E. 105, 106, 107	3	3	3	Geol. 120	0	0	4
L. A. 101, 102, 103	1	1	2	Econ. 205	0	3	0
C. E. 101, 102, 103	1	1	1	Psych. 200	3	0	0
Mil. 101, 102, 103 or Soc. 101, 102, 103	2	2	2	Arch. 201, 202, 203	3	3	3
Phys. Ed. 101, 102, 103	1	1	1	C. E. 221-2	3	3	0
				C. E. 225-227	1	0	0
	21	21	21	L. A. 201, 202, 203	2	2	2
				L. A. 212, 213	0	3	3
				Mil. 201, 202, 203 or Hist. 104	2	2	2
				Phys. Ed. 201, 202, 203	1	1	1
					21	20	21

Surveying, C. E. s310, 3 cr.

(f) Wildlife Conservation and Management,—leading to the degree of Bachelor of Science in Agriculture.

Freshman Year				Sophomore Year			
Eng. 101, 102, 103	3	3	3	Bot. 101, 102, 203	4	4	3
Chem. 101, 102, 103	4	4	4	Chem. 221	0	0	4
Math. 100 abc	3	3	3	Econ. 205	0	3	0
Zool. 101, 102	4	4	0	Agr. Econ. 212	0	0	3
Geol. 120	0	0	4	Eng. 231	3	0	0
Hist. 101, 102, 103	3	3	3	Zool. 222, 223	0	4	4
Zool. 113	0	0	1	F. C. 202	0	3	0
Mil. 101, 102, 103 or alt.	2	2	2	Zool. 251, 252, 253	2	2	2
P. E. 101, 102, 103	1	1	1	Hort. 301	3	0	0
	20	20	21	C. E. 221, 222	3	3	0
				C. E. 225	1	0	0
				For. 111	3	0	0
				Mil. 201, 202, 203 or alt.	2	2	2
				Phys. Ed. 201, 202, 203	1	1	1
					22	22	19

2. **In Teacher Training.** (For complete curricula see pages 121-124.)

(a) Leading to the degree of Bachelor of Science in Agricultural Education.

Freshman Year				Sophomore Year			
Eng. 101, 102, 103	3	3	3	Agr. Eng. 202	3	0	0
Chem. 101, 102, 103	4	4	4	Soils, 201	0	0	4
Bot. 102	0	4	0	Econ. 201, 202	3	3	0
Zool. 101	4	0	0	Agr. Econ. 202	0	0	3
Math. 100 abc	3	3	3	Phys. 115	5	0	0
Hist. 101, 102, 103	3	3	3	Zool. 202 or Bot. 221	0	0	5
Geol. 120	0	0	4	Zool. 102	0	4	0
Mil. 101, 102, 103 or alt.	2	2	2	Bot. 101	4	0	0
Phys. Ed. 101, 102, 103	1	1	1	Chem. 221	0	4	0
	20	20	20	A. H. 202	0	3	0
				Poul. 201	0	3	0
				For. 111	3	0	0
				Hort. 203	0	0	3
				F. C. 202	0	0	3
				Mil. 201, 202, 203 or alt.	2	2	2
				Phys. Ed. 201, 202, 203	1	1	1
					21	20	21

(b) Leading to the degree of Bachelor of Science in Industrial Arts Education,

also

(c) Leading to the degree of Bachelor of Science in Industrial Education.

Freshman Year				Sophomore Year			
Eng. 101, 102, 103	3	3	3	Eng. 211, 222, 231	3	3	3
Math. 100 abc	3	3	3	Phys. 105, 106, 107	4	4	4
Chem. 101, 102, 103 or optional science	4	4	4	Hist. 101, 102, 103	3	3	3
M. E. 105, 106, 107	3	3	3	Arch. 101, 102, 103	2	2	3
Ed. 106	3	3	3	Soc. 202, 203	3	3	0
Mil. 101, 102, 103 or alt.	2	2	2	M. E. 124, 125, 126	2	2	2
Phys. Ed. 101, 102, 103	1	1	1	Mil. 201, 202, 203 or Elect.	2	2	2
	19	19	19	Phys. Ed. 201, 202, 203	1	1	1
				Elective	0	0	3
					20	20	21

(d) Leading to the degree of Bachelor of Science in Vocational Guidance.

Freshman Year				Sophomore Year			
Eng. 101, 102, 103	3	3	3	Eng. 211, 222, 231	3	3	3
Math. 100 abc	3	3	3	Science	4	4	4
Science	4	4	4	Soc. 202, 203	3	3	0
Hist. 101, 102, 103	3	3	3	Psychol. 209	3	0	0
Ed. 103	0	0	3	Psychol. 290	0	3	0
Geol. 222	0	3	0	Psychol. 291	0	0	3
Geol. 120	4	0	0	Geol. 303	0	0	3
Mil. 101, 102, 103 or Hist. 104	2	2	2	Mil. 201, 202, 203 or Elect.	2	2	2
P. E. 101, 102, 103	1	1	1	P. E. 201, 202, 203	1	1	1
				*Electives	3	3	3
	20	19	19		19	19	19

* Electives to be selected with aid of adviser to meet special needs of individual students.

3. In Engineering. (For complete curricula see pages 70-107.)

Freshman Year (for all Engineering Curricula)

Freshman Year (for all Engineering curricula)			
Eng. 101, 102, 103	3	3	3
Math. 101, 102, 103	6	6	6
Chem. 101, 102, 103	4	4	4
M. E. 105, 106, 107	3	3	3
Mil. 101, 102, 103 or Hist.			
Phys. Ed. 101, 102, 103	1	1	1
	19	19	19

Summer—C. E. s200, 3 credits.

(a) Leading to the degree of Bachelor of Architectural Engineering.

Sophomore Year			
Math. 201, 202, 203	4	4	4
*Eng. 211, 231, and one of the following: Eng. 261, Eng. 261, 262, 263, 265, 266, 267	3	3	3
Phys. 201, 202, 203	4	4	4
E. M. 311, 312	0	3	3
Arch. 201, 202, 203	3	3	3
Arch. 2?5	2	0	0
Arch. 204	1	0	0
Mil. 201, 202, 203 or alt.	2	2	2
Phys. Ed. 201, 202, 203	1	1	1
	20	20	20

(b) Leading to the degree of Bachelor of Ceramic Engineering.

Sophomore Year			
Math. 201, 202, 203	4	4	4
Chem. 211, 212	4	4	0
Phys. 201, 202, 203	4	4	4
Geol. 220, 230	3	0	3
*Eng. 211, 231, 261	3	3	3
Cer. Eng. 102, 103	0	3	3
Mil. 201, 202, 203 or alt.	2	2	2
Phys. Ed. 201, 202, 203	1	1	1
	21	21	20

(c) Leading to the degree of Bachelor of Chemical Engineering.

Sophomore Year

Math. 201, 202, 203	4	4	4
*Eng. 211, 231 and any one of Eng. 261-267	3	3	3
Chem. E. 201, 202, 203	1	1	1
Phys. 201, 202, 203	4	4	4
Chem. 211, 212, 213	4	4	4
M. E. 121, 122, 123	1	1	1
Mil. 201, 202, 203 or alt.	2	2	2
Phys. Ed. 201, 202, 203	1	1	1
	20	20	20

(d) Leading to the degree of Bachelor of Civil Engineering.

Sophomore Year

Math. 201, 202, 203	4	4	4
*Eng. 211, 231 and one of Eng. 261-267	3	3	3
Phys. 201, 202, 203	4	4	4
C. E. 221, 222, 223	3	3	3
C. E. 225, 226, 227	1	1	1
Geol. 220	3	0	0
E. M. 311, 312	0	3	3
Mil. 201, 202, 203 or alt.	2	2	2
Phys. Ed. 201, 202, 203	1	1	1
	21	21	21

(e) Leading to the degree of Bachelor of Electrical Engineering.

Sophomore Year

Math. 201, 202, 203	4	4	4
Phys. 201, 202, 203	4	4	4
*Eng. 211, 231 and one of Eng. 261, 221 or 337	3	3	3
Econ. 201, 202, 203	3	3	3
E. E. 201, 202	3	3	0
M. E. 123	0	0	3
Mil. 201, 202, 203 or alt.	2	2	2
Phys. Ed. 201, 202, 203	1	1	1
	20	20	20

(f) Leading to the degree of Bachelor of Geological Engineering.

Sophomore Year

Math. 201, 202, 203	4	4	4
*Eng. 211, 231 and one of Eng. 261-267	3	3	3
Chem. 211, 212, 213	4	4	4
Phys. 201, 202, 203	4	4	4
Geol. 220, 222, 230	3	3	3
Mil. 201, 202, 203 or alt.	2	2	2
Phys. Ed. 201, 202, 203	1	1	1
	21	21	21

(g) Leading to the degree of Bachelor of Industrial Engineering.

Sophomore Year

Math. 201, 202, 203	4	4	4
*Eng. 211, 231, and one of Eng. 261-267	3	3	3
Phys. 201, 202, 203	4	4	4
Econ. 201, 202, 203	3	3	3
M. E. 124, 125, 126	2	2	2
I. E. 101, 102, 103	3	3	3
Mil. 201, 202, 203 or alt.	2	2	2
Phys. Ed. 201, 202, 203	1	1	1
	22	22	22

(h) Leading to the degree of Bachelor of Mechanical Engineering.

Sophomore Year

Math. 201, 202, 203	4	4	4
Eng. 211, 231	3	3	0
Phys. 201, 202, 203	4	4	4
M. E. 211, 212, 213	2	2	2
M. E. 221, 222, 223	2	2	2
M. E. 124, 125, 126	2	2	2
E. M. 311	0	0	3
Mil. 201, 202, 203 or alt.	2	2	2
Phys. Ed. 201, 202, 203	1	1	1
	20	20	20

(i) Leading to the degree of Bachelor of Science in Engineering.

Sophomore Year

Math. 201, 202, 203	4	4	4
Phys. 115, 116, 117	5	5	5
*English or Modern Language	3	3	3
†Elective	4	4	4
Mil. 201, 202, 203 or alt.	2	2	2
Phys. Ed. 201, 202, 203	1	1	1
	19	19	19

4. **In Textiles.** (For complete curricula see pages 113-115.)

(a) Leading to the degree of Bachelor of Science in Textiles in one of the following: Textile Manufacturing, Textile Chemistry and Dyeing, Textile Management, Weaving and Designing, and Yarn Manufacturing.

Freshman Year

Eng. 101, 102, 103	3	3	3
Phys. 111, 112, 113	4	4	4
Math. 101, 102	6	6	0
M. E. 121, 122, 123	1	1	1
M. E. 101, 102, 103	2	2	2
Tex. 101, 102, 103, 105	1	1	4
Mil. 101, 102, 103 or Hist. 104	2	2	2
Phys. Ed. 101, 102, 103	1	1	1
	20	20	17

Sophomore Year

Hist. 101, 102, 103	3	3	3
Arch. 106 or Phys. 311	3	0	0
Phys. 311 or Arch 106	0	0	3
Chem. 101, 102, 103	4	4	4
F. C. 201, 212	3	3	0
Tex. 201, 203, 205	1	0	4
Tex. 231, 232, 234	1	3	0
Tex. 236, 237	0	2	2
Tex. 207, 208, 209, 211	3	1	1
Mil. 201, 202, 203 or alt.	2	2	2
Phys. Ed. 201, 202, 203	1	1	1
	21	19	20

* Students who do not make an average grade of B or better in Freshman English will be required to continue English in the Sophomore year.

† Free electives,—except that not more than 15 term credits may be chosen from the technical or special technical courses in the School of Engineering.

THE SCHOOL OF AGRICULTURE AND FORESTRY

Ira Obed Schaub, *Dean and Director of Extension*
Zeno Payne Metcalf, *Director of Instruction*

Organization.—North Carolina is one of the foremost States in the Union in the value of farm crops. The scientific investigations, demonstrations, and instruction of State College, in coöperation with the State Department of Agriculture, have been particularly effective in promoting better methods of farming, and in adopting scientific agriculture. The majority of the people of the State employed in gainful occupations are devoting their energies to some form of agriculture, and the greater part of their wealth and prosperity is derived from this great vocation.

The art of cultivating the soil properly and living well at home, the value of selecting that form of agriculture which is in greatest demand, and the best method of turning the surplus products into commercial channels that will be most profitable to the producer, are matters of the greatest concern to the people of the State. The School of Agriculture has been reorganized for the purpose of rendering a much larger service to the State along these and other lines. The Experiment Station and the Extension Service have been more closely united with College instruction, and the courses of study have been so organized and the instruction so broadened as to offer much larger opportunities to young men entering the College, and to farmers and other agricultural workers throughout the State.

Growth.—Beginning a generation ago on a very small scale, the School of Agriculture and Forestry has grown until today it embraces the following important divisions: (a) Agricultural Economics, including Farm Marketing, Farm Management, and Rural Sociology; (b) Agronomy, including Field Crops, Soils, Plant Breeding, and Agricultural Engineering; (c) Animal Industry, including Animal Production, Animal Nutrition, Dairy Production, and Dairy Manufacturing; (d) Botany, including Bacteriology, Plant Physiology, and Plant Diseases; (e) Chemistry; (f) Horticulture, including Pomology, Small-Fruit Culture, Floriculture, Truck Farming, and Landscape Architecture; (g) Forestry; (h) Poultry Science, including Poultry Diseases, Poultry Breeding, Poultry Feeding, and Poultry Management; (i) Zoölogy, including Genetics, Entomology, Animal Physiology, and Wild Life Management.

Purpose.—The purpose of the School of Agriculture and Forestry is threefold: (1) To secure through scientific research, experimentation, and demonstration accurate and reliable information relating to soils, plants, and animals, and to secure from every available source reliable statistical, technical, and scientific data relating to every phase of agriculture that might be of advantage to the State; (2) to provide instruction in the College for young men who desire to enter the field of general agriculture, or wish to become professionals in agricultural education or specialists in any field of science related to agriculture; (3) to disseminate reliable information

through publications and through extension agents, and by a wise use of this information to give instruction to agricultural workers in the scientific, experimental, and practical progress in the various lines of agriculture.

All effective instruction in agriculture is based on research and investigation; and the curricula are so organized that not only the subject matter for classroom instruction and extension work may be drawn from research, experimentation, and demonstration, but that the students themselves shall have the opportunity to work under the direction of research specialists.

The vocations open to young men well trained in agriculture and the opportunities afforded for distinct service to the State are now greater than ever before. In order that the more important vocations in agriculture may be presented to the youth of the State, the courses of study are so organized as to give specific training for the following major vocations:

General Farming
Agricultural Extension Agents
Agricultural Specialists
in State or Federal Departments
Stock Raising and Dairying
Poultrymen
Specialists in the Manufacture
of Dairy Products
Foresters
Fruit Growers
Truck Farming

Agricultural Specialists in Foreign Lands

In addition to these major vocations, the School of Agriculture gives instruction in Beekeeping, Floriculture, and the basic instruction for teachers of Agriculture.

Admission: Advanced Standing.—Regulations for admission and for advanced standing are stated under Information for Applicants.

Graduates in Liberal Arts.—Selected courses leading to the degree Bachelor of Science in Agriculture are offered to graduates of universities and standard colleges. These are arranged in accordance with the vocational aim of the individual student, and in the light of credits presented from the institution from which the student has been graduated, subject to the approval of his adviser and the Director of Instruction. In cases where the student presents enough credits which may be used for courses required in his curriculum he may be graduated with a B.S. degree in one year. In no case should it take more than two years to complete the work for this degree.

Graduation.—The requirement for graduation is the satisfactory completion of one of the curricula outlined below.

A minimum of 230 term credits with at least 230 honor points is required for graduation from the School of Agriculture. The term credits should be distributed as follows: A maximum of 60 in the major Department, and a minimum of 18 in Language, 24 in Physical Science, 18 in Social Science, 12 in Military Science or alternative, and 6 in Physical Education.

Students entering with advanced standing are required, in the remainder of their course, to earn at least as many points as the number of term credits remaining necessary for graduation.

Degrees.—The degrees of Bachelor of Science in Agriculture and Bachelor of Science in Forestry are conferred upon the satisfactory completion of one of the curricula in this School.

The degree of Master of Science in Agriculture is offered for the satisfactory completion of one year of graduate study in residence. Candidates for this degree are enrolled as students in the Graduate School.

The professional degree of Master of Agriculture may be conferred upon graduates of State College after five years of service in Agriculture, and upon the acceptance of a satisfactory thesis.

Curricula.—The curricula in Agriculture offer a combination of practical and theoretical work. About half of the time is devoted to lectures and recitations, the other half to work in shops, laboratories, greenhouses, dairy, poultry yards, and on the College farm.

In order that every graduate of the School of Agriculture shall acquire a liberal education in lieu of specializing too narrowly, and shall become a leader having breadth of vision, the curricula in Agriculture contain broadening subjects such as language, literature, history, and the social sciences.

The School of Agriculture and Forestry offers the following curricula:

A. In General Agriculture with opportunities to specialize during junior and senior years in any of the following:

1. Farm Business Administration
2. Farm Marketing and Farm Finance
3. Rural Sociology
4. Animal Production
5. Dairy Manufacturing
6. Entomology
7. Field Crops and Plant Breeding
8. Floriculture
9. Plant Pathology
10. Pomology
11. Poultry Science
12. Soils
13. Vegetable Gardening
14. Agricultural Chemistry

B. In Agricultural Engineering
C. In Forestry
D. In Landscape Architecture
E. In Wildlife Management

GENERAL AGRICULTURE

First Two Years.—The freshman and sophomore years for all courses are outlined on a following page. This curriculum is intended to train students in broad basic fields of agriculture. For junior and senior years the curriculum of each student is to be arranged in accordance with his vocational aims subject to the approval of his adviser and the Director of Instruction.

Professional Opportunities.—Students who specialize in General Agriculture may look forward to any of the following professions.

Specialists in State or Federal Departments, or in Agricultural Colleges.—The School of Agriculture is equipped to train men as specialists in the various fields as indicated by the curricula outlined below.

Inspectors.—Most States now maintain inspection of fertilizers, seeds, nurseries, and insecticides. Most cities have special inspectors for their milk supplies. Students seeking vocational opportunities in these fields may elect appropriate subjects in their junior and senior years.

Extension Specialists.—Students in this group will find employment as agricultural agents for railroads, and for commercial firms dealing in agricultural products; as specialists in the various fields of agriculture in the extension departments of agricultural colleges, and as county agricultural agents.

County Agents.—The growing importance of marketing agricultural products and the need for better organization of farms has given rise to a strong demand for county agents who have had special training in Agricultural Economics.

Specialists and Commercial Agricultural Agents.—The School of Agriculture is well equipped to train men for agricultural industries, such as manufacturing fertilizers, livestock and poultry feeds, farm machinery, and dairy and horticultural products. These concerns are usually anxious to obtain men who have had actual agricultural experience, and who, in addition, have had special training in agricultural economics, accounting, and statistics. This field is developing rapidly and offers a fine opportunity for students who wish to enter the purely commercial field.

Agricultural Specialists in Foreign Lands.—The School of Agriculture is well equipped to train men as experts in cotton and tobacco production in foreign lands.

Junior Agricultural Economist.—A position as a Junior Agricultural Economist involves research in Agricultural Economics. Such positions are usually available in the governmental departments such as United States Department of Agriculture and in various State institutions.

Farm Manager.—There is a growing demand for men who have had practical farm experience and who have special training in farm organization and management. This field is practically a new one, and there have been many requests for men with special training in farm management.

Marketing Specialists.—There is a growing demand for men who can manage coöperative marketing and other farmers' business associations.

CURRICULUM FOR ALL COURSES IN GENERAL AGRICULTURE

Freshman Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Composition, Eng. 101, 102, 103	3	3	3
General Inorganic Chemistry, Chem. 101, 102, 103	4	4	4
General Botany, Bot. 102	0	4	0
General Zoology, Zool. 101	4	0	0
Physical Geology, Geol. 120	0	0	4
Economic History, Hist. 101, 102, 103	3	3	3
Mathematical Analysis, Math. 100 a-b-c	3	3	3
Military Science I, Mil. 100, or alternate	2	2	2
Fundamental Activities and Hygiene, P.E. 101, 102, 103	1	1	1
	20	20	20

Sophomore Year

Farm Equipment, Agr. Eng. 202	0	3	0
Soils, Soils 201	0	0	4
General Economics, Econ. 201, 202	3	3	0
Agricultural Economics, Agr. Econ. 202	0	0	3
Physics for Agricultural Students, Phys. 115	5	0	0
Animal Physiology, Zool. 202, or Plant Physiology, Bot. 221	0	0	5
Economic Zoology, Zool. 102	0	4	0
General Botany, Bot. 101	4	0	0
Introduction to Organic Chemistry, Chem. 221	0	4	0
Animal Nutrition I, A. H. 202	0	3	0
General Poultry, Poul. 201	3	0	0
Principles of Forestry, For. 111	3	0	0
General Horticulture, Hort. 203	0	0	3
General Field Crops, F.C. 202	0	0	3
Military Science II, Mil. 200, or alternate	2	2	2
Sport Activities, P.E. 201, 202, 203	1	1	1
	21	20	21

CURRICULA IN AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY

Farm Business Administration Option

For Freshman and Sophomore years see above.

Junior Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
English	3	3	3
Farm Management I, Agr. Econ. 303	0	0	3
Accounting, Econ. 301-302-303	3	3	3
Statistical Methods, Econ. 408-409	3	3	0
Woodworking, M.E. 127	0	3	0
Technical Agricultural Courses	3	3	3
Electives	6	3	6
	18	18	18

Senior Year

Statistical Analysis of Agricultural Data, Agr. Econ. 461-2-3	2	2	2
Agricultural Finance, Agr. Econ. 432	0	3	0
Farm Management II, Agr. Econ. 423	0	0	3
Farm Buildings, Agr. Eng. 322	0	3	0
Farm Cost Accounting, Agr. Econ. 402, 403	0	3	3
Business Law, Econ. 307	3	0	0
Agr. Marketing, Agr. Econ. 411	3	0	0
Soils of North Carolina, Soils 312	0	3	0
Drawing, C.E. 101-102-103	1	1	1
Terracing and Drainage, Agr. Eng. 303	0	0	3
Technical Agricultural Courses	3	3	3
Electives	6	3	3
	18	21	18

Farm Marketing and Farm Finance Option

For Freshman and Sophomore years refer to page 51.

Junior Year

Courses	Credits *First Term*	*Second Term*	*Third Term*
English	3	3	3
Marketing Methods, Econ. 311-312	3	3	0
Rural Sociology, Rur. Soc. 302	0	3	0
Agr. Marketing, Agr. Econ. 411	3	0	0
Statistical Methods, Econ. 408-409	3	3	0
Accounting I, Econ. 301-302-303	3	3	3
Electives	3	3	12
	18	18	18

Senior Year

Statistical Analysis of Agricultural Data, Agr. Econ. 461-2-3	2	2	2
Marketing Methods and Problems, Agr. Econ. 421	3	0	0
Cotton and Tobacco Marketing, Agr. Econ. 442	0	3	0
Agricultural Finance, Agr. Econ. 432	0	3	0
Agricultural Cooperation, Agr. Econ. 422	0	3	0
Farm Cost Accounting, Agr. Econ. 402, 403	0	3	3
Farm Management I, Agr. Econ. 303	0	0	3
Community Organization, Rur. Soc. 413	0	0	3
Money, Credit, and Banking, Econ. 321-322	3	3	0
Business Finance, Econ. 323	0	0	3
Business Law, Econ. 307	3	0	0
Technical Agriculture	3	3	3
Electives	3	0	0
	17	20	17

Rural Sociology Option

For Freshman and Sophomore years refer to page 51.

Junior Year

Courses	Credits *First Term*	*Second Term*	*Third Term*
English	3	3	3
General Sociology, Soc. 202-203	3	3	0
Rural Sociology, Rur. Soc. 302	0	0	3
History of Agriculture, Hist. 318	0	0	3
Statistical Methods, Econ. 408-409	3	3	0
American National Government, Gov. 200	3	0	0
State Government and Administration, Gov. 201	0	3	0
Municipal Government and Administration, Gov. 202	0	0	3
Accounting, Econ. 301-302-303	3	3	3
Electives	3	3	3
	18	18	18

Senior Year

Statistical Analysis of Agricultural Data, Agr. Econ. 461-2-3	2	2	2
Social Psychology, Psychol. 305	0	3	0
Social Pathology, Soc. 401	0	0	3
Farmers Movements, Rur. Soc. 403	0	0	3
The Family Organization, Soc. 406	3	0	0
Community Organization, Rur. Soc. 413	0	0	3
Population Problems, Soc. 411	0	3	0
Farm Management I, Agr. Econ. 303	0	0	3
Agr. Marketing, Agr. Econ. 411	3	0	0
Agricultural Cooperation, Agr. Econ. 422	0	3	0
Technical Agriculture	6	6	0
Electives	3	3	3
	17	20	17

CURRICULUM IN ANIMAL PRODUCTION

For Freshman and Sophomore years refer to page 51.

Junior Year

	CREDITS		
COURSES	*First Term*	*Second Term*	*Third Term*
Dairying, A.H. 341	0	3	0
Swine Production, A.H. 331	3	0	0
Farm Meats I, A.H. 301	0	3	0
Animal Nutrition II, A.H. 361	3	0	0
History of Breeds, A.H. 322-323	0	3	3
Herd Improvement, A.H. 413	0	0	3
Business English, Eng. 211	0	0	3
Public Speaking, Eng. 231	0	3	0
Southern Writers, Eng. 275	3	0	0
Genetics, Zool. 411	4	0	0
Legumes and Grasses, F.C. 403	0	0	4
Chemistry of Vitamins, Chem. 462	0	3	0
Farm Engines, Agr. Eng. 212	0	3	0
Market Grading of Field Crops, F.C. 451	3	0	0
Animal Hygiene and Sanitation, A.H. 353	0	0	3
Electives	3	0	3
	19	18	19

Senior Year

Animal Breeding, A. H. 421	4	0	0
Sheep Production, A. H. 313	0	0	3
Beef Cattle, A. H. 372	0	3	0
Pure Bred Livestock Production, A. H. 432	0	3	0
Stock Farm Management, A. H. 433	0	0	3
Horse and Mule Production, A.H. 351 or Dairy Cattle and Milk Production, A.H. 321	3	0	0
Senior Seminar, A.H. 391-392-393	1	1	1
Incubation and Brooding, Poul. 303	0	0	3
Terracing and Drainage, Agr. Eng. 303	0	0	3
General Bacteriology, Bot. 402	0	4	0
Fruit Growing, Hort. 331	4	0	0
Agricultural Marketing, Agr. Econ. 411	3	0	0
Testing of Milk Products, A.H. 332	0	4	0
Business Law, Econ. 307	0	0	3
Electives	3	3	3
	18	18	19

CURRICULUM IN DAIRY MANUFACTURING

For Freshman and Sophomore years refer to page 51.

Junior Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Creamery Buttermaking, A.H. 371	4	0	0
Testing of Milk Products, A.H. 332	0	4	0
Ice Cream Making, A.H. 331	4	0	0
Cheese Making, A.H. 333	0	0	3
Dairy Manufacturing Practice, A.H. 342	0	3	0
City Milk Supply, A.H. 343	0	0	4
Business English, Eng. 211	0	0	3
Public Speaking, Eng. 231	0	3	0
Southern Writers, Eng. 275	3	0	0
Chemistry of Vitamins, Chem. 462	0	0	3
Animal Breeding, A.H. 421	4	0	0
Food and Nutrition, Chem. 432	0	3	0
Animal Hygiene and Sanitation, A.H. 353	0	0	3
Farm Engines, Agr. Eng. 212	0	3	0
Electives	3	3	3
	18	19	19

Senior Year

Dairy Machinery, A.H. 362	0	1	0
Dairy Products Judging, A.H. 394	0	0	1
Dairy Manufactures, A.H. 401-402-403	3	3	3
Senior Seminar, A.H. 391-392-393	1	1	1
General Bacteriology, Bot. 402	0	4	0
Swine Production, A.H. 331	3	0	0
Animal Nutrition II, A.H. 361	3	0	0
Farm Meats I, A.H. 301	0	3	0
Business Law, Econ. 307	0	0	3
Herd Improvement, A.H. 413	0	0	3
Food Products and Adulterants, Chem. 441	3	0	0
Stock Farm Management, A.H. 433	0	0	3
Agricultural Marketing, Agr. Econ. 411	3	0	0
Farm Accounting, Agr. Econ. 313	0	0	3
Pure Bred Livestock Production, A.H. 432	0	3	0
Electives	3	3	3
	19	18	20

CURRICULUM IN ENTOMOLOGY

For Freshman and Sophomore years refer to page 51.

Junior Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Systematic Zoology, Zool. 421-422-423	3	3	3
Genetics, Zool. 411	4	0	0
Comparative Anatomy, Zool. 222-223	0	4	4
Modern Language	3	3	3
Systematic Botany, Bot. 203	0	0	3
Physiological Chemistry, Chem. 451, 452	3	3	0
Public Speaking, Eng. 231	0	3	0
Technical Writing II, Eng. 323	0	0	3
Electives	6	3	3
	19	19	19

Senior Year

Vertebrate Embryology, Zool 461	5	0	0
Field Zoology, Zool. 433	0	0	4
Applied Entomology, Zool. 401-402-403	3	3	3
Modern Language	3	3	3
Beekeeping, Zool. 243	0	0	3
Plant Ecology, Bot. 441	3	0	0
Histology, Zool. 442	0	3	0
Bacteriology, Bot. 402	0	4	0
Electives	3	4	4
	17	17	17

CURRICULUM IN FIELD CROPS AND PLANT BREEDING

For Freshman and Sophomore years refer to page 51.

Junior Year

Courses	Credits *First Term*	*Second Term*	*Third Term*
Genetics, Zool. 411	4	0	0
English	3	3	3
Soil Fertility, Soils 221	3	0	0
Fertilizers, Soils 302	0	3	0
Cereal Crops, F.C. 302	0	4	0
Legumes and Grasses, F.C. 403	0	0	4
Major Options	5	5	4
Electives	3	3	7
	18	18	18

Senior Year

Major Options	6	6	6
Technical Agriculture	6	6	6
Electives	6	6	6
	18	18	18

CURRICULUM IN FLORICULTURE

For Freshman and Sophomore years refer to page 51.

Junior Year

Courses	Credits *First Term*	*Second Term*	*Third Term*
Public Speaking, Eng. 231	3	0	0
Plant Ecology, Bot. 441	3	0	0
Bacteriology, Bot. 402	0	4	0
Systematic Botany, Bot. 203	0	0	3
Diseases of Fruit and Vegetable Crops, Bot. 303	0	0	3
Genetics, Zool. 411	4	0	0
Economic Entomology, Zool. 203	0	0	4
Plant Propagation, Hort. 301	0	3	0
Soil Fertility, Soils 221	3	0	0
Soils of North Carolina, Soils 312	0	3	0
Fertilizers, Soils 302	0	3	0
Woody Plants, L.A. 201-2-3	2	2	2
Terracing and Drainage, Agr. Eng. 303	0	0	3
Plant Materials: Herbaceous Plants, L.A. 303	0	0	2
Electives	3	3	3
	18	18	20

Senior Year

Business English, Eng. 211	3	0	0
Technical Writing II, Eng. 323	0	0	3
Commercial Floriculture, Hort. 341	4	0	0
Horticultural Problems, Hort. 421-22-23	2	2	2
Seminar, Hort. 431-32-33	1	1	1
Experimental Horticulture, Hort. 412	0	3	0
Agricultural Cooperation, Agr. Econ. 422	0	3	0
Rural Sociology, Rural Soc. 302	0	0	3
Agricultural Chemistry, Chem. 491	3	0	0
Plant Breeding, F.C. 471	3	0	0
Applied Psychology, Psychol. 202	0	3	0
Landscape Gardening, L.A. 403	0	0	3
Electives	3	6	6
	19	18	18

CURRICULUM IN PLANT PATHOLOGY

For Freshman and Sophomore years refer to page 51.

Junior Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Business English, Eng. 211	3	0	0
Public Speaking, Eng. 231	0	3	0
Technical Writing II, Eng. 323	0	0	3
Bacteriology, Bot. 402	0	4	0
Diseases of Field Crops, Bot. 301	3	0	0
Diseases of Fruit and Vegetable Crops, Bot. 303	0	0	3
Plant Ecology, Bot. 441	3	0	0
Economic Entomology, Zool. 213	0	0	4
Plant Morphology, Bot. 411, 412	3	3	0
Plant Breeding, F.C. 471	3	0	0
Electives	3	8	8
	18	18	18

Senior Year

Plant Microtechnique, Bot. 451	3	0	0
Advanced Plant Pathology, Bot. 401	0	5	0
Mycology, Bot. 421, 422, 423	3	3	3
Soil Microbiology, Bot. 443	0	0	3
Genetics, Zool. 411	4	0	0
Microanalysis of Plant Tissue, Bot. 442	0	3	0
Qualitative Analysis, Chem. 211	4	0	0
Quantitative Analysis, Chem. 233	0	0	4
Electives	4	7	8
	18	18	18

CURRICULUM IN POMOLOGY

For Freshman and Sophomore years refer to page 51.

Junior Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Public Speaking, Eng. 231	3	0	0
Business English, Eng. 211	0	3	0
Technical Writing II, Eng. 323	0	0	3
Plant Ecology, Bot. 441	3	0	0
Small Fruits and Grapes, Hort. 311	3	0	0
Plant Propagation, Hort. 301	0	3	0
Vegetable Gardening, Hort. 303	0	0	4
Soil Fertility, Soils 221	3	0	0
Fertilizers, Soils 302	0	3	0
Terracing and Drainage, Agr. Eng. 303	0	0	3
Ornamental Plants, L.A. 402	0	2	0
Landscape Gardening, L.A. 403	0	0	3
Genetics, Zool. 411	4	0	0
Economic Entomology, Zool. 213	0	0	4
Applied Psychology, Psychol. 202	0	3	0
Electives	3	3	3
	19	17	20

Senior Year

Bacteriology, Bot. 402	0	4	0
Diseases of Fruit and Vegetable Crops, Bot. 303	0	0	3
Systematic Botany, Bot. 203	0	0	3
Systematic Pomology, Hort. 401	2	0	0
Fruit Growing, Hort. 331	4	0	0
Horticulture Problems, Hort. 421-22-23	2	2	2
Seminar, Hort. 431-32-33	1	1	1
Experimental Horticulture, Hort. 412	0	3	0
Farm Management I, Agr. Econ. 303	0	0	3
Plant Breeding, F.C. 471	3	0	0
Farm Meats I, A.H. 301	0	3	0
Agricultural Chemistry, Chem 491	3	0	0
Rural Sociology, Rur. Soc. 302	0	3	0
Poultry Elective	0	0	3
Electives	3	3	3
	18	19	18

CURRICULUM IN POULTRY SCIENCE

For Freshman and Sophomore years refer to page 51.

Junior Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
English Elective	0	3	0
Technical Writing II, Eng. 323	0	0	3
Public Speaking, Eng. 231	0	0	3
Poultry Anatomy, Poul. 311, 312	3	3	0
Poultry Judging, Poul. 301	4	0	0
Poultry Nutrition, Poul. 333	0	0	4
Preparation and Grading of Poultry Products, Poul. 332	0	3	0
Incubation and Brooding, Poul. 303	0	0	3
Bacteriology, Bot. 402	0	4	0
Genetics, Zool. 411	4	0	0
Vertebrate Embryology, Zool. 461	5	0	0
Cereal Crops, F.C. 302	0	4	0
Farm Management I, Agr. Econ. 303	0	0	3
Electives	3	3	3
	19	20	19

Senior Year

Poultry Diseases, Poul. 401, 402	4	4	0
Sero-Diagnosis in Poultry Diseases, Poul. 403	0	0	3
Commercial Plant Management, Poul. 412	0	3	0
Selecting and Mating Poultry, Poul. 413	0	0	3
Senior Seminar, Poul. 423	0	0	3
Swine Production, A.H. 331	3	0	0
Dairy Cattle and Milk Production, A.H. 321	3	0	0
Fruit Growing, Hort. 331	4	0	0
Farm Meats I, A.H. 301	0	3	0
Rural Sociology, Rur. Soc. 302	0	3	0
Agr. Marketing, Agr. Econ. 411	3	0	0
Terracing and Drainage, Agr. Eng. 303	0	0	3
Chemistry of Vitamins, Chem. 462	0	3	0
Electives	3	3	6
	20	19	18

CURRICULUM IN SOILS

For Freshman and Sophomore years refer to page 51.

Junior Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
English Elective or Modern Language	3	3	3
Soil Fertility, Soils 221	3	0	0
Fertilizers, Soils 302	0	3	0
Soils of North Carolina, Soils 312	0	3	0
Qualitative and Quantitative Analysis, Chem. 211, 212, 213	4	4	4
Legumes and Grasses, F.C. 403	0	0	4
Electives	9	6	6
	19	19	17

Senior Year

Soil Technology, Soils 411-412-413	3	3	3
Pedology, Soils 401	3	0	0
Soil Conservation and Land Use, Soils 433	0	0	3
Soils Seminar, Soils 451-452-453	1	1	1
Bacteriology, Bot. 402	0	4	0
Organic Chemistry, Chem. 422, 423	0	4	4
Drawing, C.E. 101-2-3	1	1	1
Electives	10	4	6
	18	17	18

CURRICULUM IN VEGETABLE GARDENING

For Freshman and Sophomore years refer to page 51.

Junior Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Public Speaking, Eng. 231	3	0	0
Business English, Eng. 211	0	3	0
Plant Ecology, Bot. 441	3	0	0
Bacteriology, Bot. 402	0	4	0
Systematic Botany, Bot. 203	0	0	3
Diseases of Fruit and Vegetable Crops, Bot. 303	0	0	3
Fruit Growing, Hort. 331	4	0	0
Plant Propagation, Hort. 301	0	3	0
Vegetable Forcing, Hort. 302	0	3	0
Vegetable Gardening, Hort. 303	0	0	4
Soil Fertility, Soils 221	3	0	0
Fertilizers, Soils 302	0	3	0
Genetics, Zool. 411	4	0	0
Economic Entomology, Zool. 213	0	0	4
Terracing and Drainage, Agr. Eng. 303	0	0	3
Electives	3	3	3
	20	19	20

Senior Year

Technical Writing II, Eng. 323	3	0	0
Systematic Olericulture, Hort. 411	2	0	0
Small Fruits and Grapes, Hort. 311	3	0	0
Horticultural Problems, Hort. 421-22-23	2	2	2
Seminar, Hort. 431-32-33	1	1	1
Experimental Horticulture, Hort. 412	0	3	0
Home Floriculture, Hort. 313	0	0	3
Agricultural Chemistry, Chem. 491	3	0	0
Plant Breeding, F.C. 471	3	0	0
Ornamental Plants, L.A. 402	0	2	0
Landscape Gardening, L.A. 403	0	0	3
Agriculture Cooperation, Agr. Econ. 422	0	3	0
Dairying, A.H. 341	0	3	0
Soils of North Carolina, Soils 312	0	3	0
Rural Sociology, Rur. Soc. 302	0	0	3
Electives	3	3	6
	20	20	18

CURRICULUM IN AGRICULTURAL CHEMISTRY

For Freshman year refer to page 51.

Sophomore Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
General Botany, Bot. 101	4	0	0
Economic Zoology, Zool. 102	0	4	0
Animal Physiology, Zool. 202, or Plant Physiology, Bot. 221	0	0	5
Qualitative Analysis, Chem. 211	4	0	0
Quantitative Analysis, Chem. 212, 213	0	4	4
Soils, Soils 201	4	0	0
Bacteriology, Bot. 402	0	4	0
Animal Nutrition I, A.H. 202	0	0	3
General Economics, Econ. 201-202	3	3	0
Agricultural Economics, Agr. Econ. 202	0	0	3
Military Science II, Mil. 200 or alternate	2	2	2
Sport Activities, P.E. 201, 202, 203	1	1	1
	18	18	18

Junior Year

Organic Chemistry, Chem. 421, 422, 423	4	4	4
Physics for Textile Students, Phys. 111, 112, 113	4	4	4
French or German	3	3	3
Elective Chemistry	3	3	3
Elective Agriculture	3	3	3
Electives	3	3	3
	20	20	20

Senior Year

Chemistry Major	7	7	7
French or German	3	3	3
Electives	9	9	9
	19	19	19

AGRICULTURAL ENGINEERING

Purpose.—This curriculum has been arranged to give its graduates sound and fundamental training in engineering, basic training in the agricultural sciences, and a specialized study in courses involving the application of engineering knowledge to agricultural problems.

Breadth of Training.—Because of the great variety of work required of agricultural engineers, a number of subjects peculiar to other curricula are included, so that the student receives a considerable breadth of training. Engineering principles applied to agriculture have played an important part in the advancement and development of agricultural practices. Agricultural engineering as a profession, however, is of comparatively recent development, but it is rapidly becoming recognized as one of the more important of the engineering professions, since it is identified with the most important of industries—agriculture. This course is especially suited to the boy brought up on the farm, as it prepares him for a professional business, or farming career, and enables him to capitalize on his farm training.

Divisions.—Subdivided on the basis of engineering technique, Agricultural Engineering embraces three general fields: (1) Power and Machinery, including Rural Electrification; (2) Farm Structures, including Sanitation, Materials of Construction and Equipment; (3) Land Reclamation, which includes Irrigation, Drainage, Soil-Erosion Control, and other forms of mechanical improvement of agricultural lands.

Occupations Open to Graduates.—Teaching, experiment station and extension-service positions with colleges and the Government; engineers in land reclamation, drainage, or irrigation enterprises; designing, advertising, sales and production work with manufacturers of farm machinery, equipment, and building materials; rural electrification work; editorial work with publishers; appraisal, and agricultural-engineering consultant service.

CURRICULUM IN AGRICULTURAL ENGINEERING

Freshman Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Algebra, Trigonometry, and Analytical Geometry, Math. 101, 102, 103	6	6	6
Composition, Eng. 101, 102, 103	3	3	3
General Inorganic Chemistry, Chem. 101, 102, 103	4	4	4
Engineering Drawing II, M.E. 105, 106	3	3	0
Descriptive Geometry, M.E. 107	0	0	3
Military Science I, Mil. 100, or alternate	2	2	2
Fundamental Activities and Hygiene, P.E. 101, 102, 103	1	1	1
	19	19	19

Summer requirement:—Surveying, C.E. s200.

Sophomore Year

Engineering Geology, Geol. 220	3	0	0
Differential Calculus, and Integral Calculus I, II, Math. 201, 202, 203	4	4	4
Business English, *Public Speaking, Eng. 211, 231	3	0	3
Physics for Engineers, Phys. 201, 202, 203	4	4	4
Farm Equipment, Agr. Eng. 202	0	3	0
Farm Engines, Agr. Eng. 212	0	3	0
Soils, Soils 201	0	0	4
Economic History, Hist. 101, 102, 103	3	3	3
Military Science II, Mil. 200, or alternate	2	2	2
Sport Activities, P.E. 201, 202, 203	1	1	1
	20	20	21

Junior Year

Farm Buildings, Agr. Eng. 322	0	3	0
General Zoology, Zool. 101	4	0	0
General Botany, Bot. 102	0	4	0
General Economics, Econ. 201, 202	3	3	0
Agricultural Economics, Agr. Econ. 202	0	0	3
Terracing and Drainage, Agr. Eng. 303	0	0	3
Farm Conveniences, Agr. Eng. 232	0	3	0
Teaching of Farm Shop Work, Agr. Eng. 331, 332	3	3	0
Animal Nutrition I, A.H. 202	0	0	3
Engineering Mechanics, E.M. 301, 302	3	3	0
Strength of Materials, E.M. 220	0	0	3
General Field Crops, F.C. 202	0	0	3
General Horticulture, Hort. 203	0	0	3
Electives	6	0	3
	19	19	21

Senior Year

Dairy Machinery, A.H. 362	0	1	0
Farm Management I, Agr. Econ. 303	0	0	3
Technical Writing I, Eng. 321	3	0	0
Dairy Cattle and Milk Production, A.H. 321	3	0	0
Rural Sociology, Rur. Soc. 302	0	3	0
Rural Sanitation, Bot. 202	0	3	0
Farm Machinery and Tractors, Agr. Eng. 313	0	0	3
Problems in Agr. Eng., Agr. Eng. 481, 482, 483	3	0	0
Erosion Prevention, Agr. Eng. 403	0	0	3
Farm Structures, Agr. Eng. 423	0	0	3
Rural Electrification, Agr. Eng. 432	0	3	0
Soil Fertility, Soils 221	3	0	0
Soil Conservation and Land Use, Soils 433	0	0	3
Senior Seminar, Agr. Eng. 491, 492, 493	1	1	1
Electives	6	6	3
	19	17	19

* Either Principles of Journalism, Eng. 150, or some term of a course in American or English Literature may be elected in place of Public Speaking.

FORESTRY

Purposes.—The aims of the curriculum in Forestry are: (1) to train young men for work in the technical and applied fields of forestry on public or private forest land; (2) to give special training in fields of research; (3) to advance the knowledge of the entire profession.

Growth.—The profession of forestry is comparatively young in North Carolina. It began some thirty years ago and has made remarkable progress during its first quarter century of existence. The next decade promises more advancement and achievement than all of the past, because the foundation has been laid and the building of the superstructure will depend upon the expertness of the builders. In the ranks of the builders are included the United States Forest Service; State Forest Departments in a large number of States; corporations and lumber companies; individual landowners; last, but by no means least, the farm woodlands.

Occupations.—Students completing the Forestry course may look to the following fields of employment: United States Forest Service, the State Service, including not only North Carolina, but especially the Southern States and any other State organizations, the lumber companies, timber-holding companies, corporations, and individuals. The forestry program in the State of North Carolina is very materially strengthened by the presence of the national forests and the Appalachian Forest Experiment Station. These will be of direct aid in the study of forest research problems, management problems and the organization and work of the National Forest Service.

Forest Management aims to make a forest properly a permanent producing unit. All forestry is now being built on this basis.

Forest Utilization requires special courses dealing with the utilization of the products of the forest. During the third term of the senior year field studies of woodworking industries, logging operations, paper and pulp mills and problems in forest management take up most of the time.

Silviculture deals with the problems of producing a forest, such as selection of species, methods of reproduction, cutting systems, etc. The work is becoming increasingly important as our virgin timber supply is depleted.

Research in Forestry Problems is being recognized by all agencies in the fields of Forestry. Men trained in research methods are needed in the government experiment stations, state experiment stations, and private laboratories.

Graduation.—A minimum of 236 term credits with at least 236 honor points are required for graduation in Forestry.

A Field Trip through the Southeastern and the Gulf States is required for the senior class to study Applied Forestry under field and factory conditions. Local field trips are also required of other classes. A nominal fee is charged to cover the expense of these trips.

CURRICULUM IN FORESTRY

Freshman Year

COURSES	CREDITS First Term	Second Term	Third Term
Drawing, C.E. 101, 102, 103	1	1	1
Botany, General and Systematic Bot. 101, 102, 203	4	4	3
Mathematical Analysis, Math. 100 a-b-c	3	3	3
Composition, Eng. 101, 102, 103	3	3	3
Zoology, Zool. 101, 102	4	4	0
Economic Entomology, Zool. 213	0	0	4
Elementary Forestry, For. 101, 102, 103	1	1	1
Introductory Sociology, Soc. 202	0	0	3
Military Science I, Mil. 100 or Human Relations, Soc. 101, 102, 103	2	2	2
Fundamental Activities and Hygiene P.E. 101, 102, 103	1	1	1
	19	19	21

Sophomore Year

Introduction to Economics, Econ. 205	3	0	0
Land Economics, Agr. Econ. 212	0	3	0
Plant Physiology, Bot. 221	5	0	0
Dendrology, Bot. 211, 213	3	0	3
General Inorganic Chemistry, Chem. 101, 102, 103	4	4	4
Wood Technology, For. 202	0	3	0
Physical Geology, Geol. 120	0	4	0
Timber Physics, For. 203	0	0	3
Surveying, Theoretical C.E. 221, 222	0	3	3
Field Surveying, C.E. 225	0	1	0
Topographical Drawing, C.E. 224	0	0	1
Introduction to Psychology, Psychol. 200	0	0	3
Military Science II, Mil. 200, or World History, Hist. 104	2	2	2
Sport Activities, P.E. 201, 202, 203	1	1	1
	18	21	20

Summer Camp

Surveying and Mapping, C.E. s300	0	0	3
Dendrology, For. s214	0	0	3
Mensuration, For. s304	0	0	3
Silviculture, For. s204	0	0	3
			12

Junior Year

Nursery Practice, For. 313	0	0	1
Soils, Soils 201	4	0	0
Mensuration I, II, For. 402, 403	0	3	3
Silviculture I, II, For. 311, 312	3	3	0
English	3	0	3
Forest Entomology, Zool. 302	0	3	0
Plant Ecology, Bot. 441	3	0	0
Meteorology, Phys. 322	0	3	0
Forest Finance, For. 442	0	3	0
Methods of Research in Forestry, For. 333	0	0	3
Statistical Methods, Econ. 408, 409	3	3	0
Elective in Social Science Group	0	0	6
Electives	3	3	3
	19	21	19

Senior Year

Logging, For. 421	3	0	0
Lumbering, For. 422	0	3	0
Seasoning, For. 423	0	0	2
Diseases of Forest Trees, Bot. 311	3	0	0
Silviculture III, IV, For. 411, 412	3	3	0
Forest Management, For. 431, 432	3	3	0
Seminar, For. 452	0	2	0
Forest Products, For. 321	3	0	0
Forest Utilization, For. 323	0	0	2
Timber Appraisal, For. 443	0	0	2
English	0	3	0
Senior Field Trip For. 453	0	0	3
Electives	3	3	3
	18	17	12

LANDSCAPE ARCHITECTURE

A comparative study of Landscape Architecture, with Architecture, one of the oldest art of design, will disclose the fact that distinct parallelism exists between these two fields of human endeavor. Not only in the character and extent of the training required in each case is this shown, but also in the division of work which takes place, and in the relationships existing among those responsible for various parts of the work in the practice of these two closely associated professional fields.

Training in Landscape Architecture Is a Composite derived from the fields of the fine arts, certain branches of engineering, and ornamental horticulture. Properly it is dominated by the principles of design, and therefore correctly classed with Architecture, Sculpture, and Painting. Its province is the design of landscapes, and the preparation of plans and specifications for their construction.

Training in Landscape Construction Is Also a Composite derived from the same fields, but with emphasis upon the materials and methods of construction employed in Civil Engineering and ornamental horticulture. Its province is the execution of plans and specifications for landscapes as prepared by the landscape architect or designer.

Training in Landscape Gardening is essentially ornamental horticulture, with some knowledge of the principles of design and of construction. Its particular province is the maintenance of designed and constructed landscapes.

The Curriculum in Landscape Architecture is strictly undergraduate work. Its purpose is to provide a broad and thorough foundation for the additional postgraduate training required by the profession of those entering its ranks. Such subsequent training, together with some professional practice should present an open door to the entire field of the Landscape Architect, of the City Planner, or of the Regional Designer, as the professional student may elect.

Basic Agriculture.—Students who wish to fit themselves for work in Landscape Construction or in Landscape Gardening will, for their first two years, pursue the Basic Curriculum in General Agriculture, with substitutions from other curricula as indicated. The outline of the courses for the last two years will provide the necessary differentiation between these two lines of work.

Specialization at Present demands that technical training for specific lines of human endeavor shall be most efficient. The soundness of the curriculum here presented is attested not only by the fact that at no time has the demand for the services of its graduates been fully satisfied; but also by the successes of those who have pursued graduate training, and attained full rank in the professional field of Landscape Design.

CURRICULUM IN LANDSCAPE ARCHITECTURE

Freshman Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Algebra, Trigonometry, Analytical Geometry, Math. 101, 102, 103	6	6	6
Composition, Eng. 101, 102, 103	3	3	3
Botany, General and Systematic, Bot. 101, 102, 203	4	4	3
Engineering Drawing II, and Descriptive Geometry, M.E. 105, 106, 107	3	3	3
Arboriculture, L.A. 101-102-103	1	1	2
Drawing, C.E. 101, 102, 103	1	1	1
Military Science I, Mil. 100, or Human Relations, Soc. 101, 102, 103	2	2	2
Fundamental Activities and Hygiene, P.E. 101, 102, 103	1	1	1
	21	21	21

Sophomore Year

Business English and Technical Writing, Eng. 211, 275	3	3	0
Plant Physiology, Bot. 221	0	0	5
Plant Propagation and Nursery Practice, Hort. 301	3	0	0
Physical Geology, Geol. 120	0	0	4
Introduction to Economics, Econ. 205	0	3	0
Introduction to Psychology, Psychol. 200	3	0	0
Introduction to Architecture, Arch. 201	3	0	0
Elements of Architecture, Arch. 202, 203	0	3	3
Surveying, Theoretical, C.E. 221, 222	3	3	0
Field Surveying, C.E. 225, 227	1	0	1
Plant Materials, Woody Plants, L.A. 201-202-203	2	2	2
Theory of Landscape Design, L.A. 212-213	0	3	3
Military Science II, Mil. 200, or World History, Hist. 104	2	2	2
Sport Activities, P.E. 201, 202, 203	1	1	1
	21	20	21

Surveying, C.E. s310, concurrent with Summer School, 3 credits.

Junior Year

Plant Materials: Herbaceous Plants, L.A. 303	0	0	2
Plant Ecology: Bot. 441	3	0	0
History of Landscape Design, L.A. 311-312	3	3	0
Landscape Design I, L.A. 321-322-323	4	4	4
Public Speaking, Eng. 231	0	0	3
Shade and Shadows, Arch. 205	2	0	0
Freehand Drawing I, Pen and Pencil Drawing, Arch. 101	2	0	0
Freehand Drawing II, Water Color, Arch. 102	0	2	0
Freehand Drawing III, Charcoal, Arch. 103	0	0	2
Perspective Drawing, Arch. 206	0	2	0
Economic Zoology and Entomology, Zool. 102, 213	0	4	4
History of Architecture, Arch. 321, 322	3	3	0
Electives	3	0	5
	20	18	20

Senior Year

Planting Design, L.A. 411-412-413	3	3	3
Landscape Design II, L.A. 421-422-423	4	4	4
City Problems, L.A. 432	0	3	0
Landscape Construction, L.A. 451-452-453	2	2	2
Pencil Sketching, Arch. 100	3	0	0
Accounting for Engineers, Econ. 212	0	3	0
Appreciation of Fine Arts, Arch. 111-112-113	3	3	3
Electives	3	0	6
	18	18	18

WILDLIFE CONSERVATION AND MANAGEMENT

Principles.—The Wildlife Management Curriculum is based on the following fundamental principles: (1) All forms of wild animal life must be considered in any extensive system of wildlife management; (2) the animal life of any given area is in close relationship to the vegetation existing in that area; (3) in favorable environment, the species of wildlife will normally produce a surplus, a part of which can be harvested each year in a manner similar to the harvesting of other crops.

Conservative Approach.—Since wildlife management is just getting under way in this country, it would not seem advisable to encourage too rapid an expansion of this profession at the present time, although there is a distinct need for a moderate number of well-trained men to promote and supervise wildlife management in the many sections of the country.

Positions.—The curriculum is designed to furnish a technical and practical background for the following types of positions: (1) Wildlife-Management technicians in State Game and Fish Departments; (2) Biologists in the United States Biological Survey, Forest Service, Soil Conservation Service, National Park Service, and other Federal Land-Use Departments; (3) Game Managers on private preserves or leased areas, State game refuges, and on other land areas which are being developed primarily for wildlife.

Research.—Because of the great need for research and experimental work in this field, the required courses in the curriculum are also designed to give the basic technique necessary to students who may desire to enter this phase of wildlife management. Several elective courses will be available for junior and senior students to enable them to specialize in some particular phase of the work.

State Advantages.—Unusual advantages are offered to competent students by the wide range of natural environments in the North Carolina Coastal Plain, Piedmont, and Mountain Region. Further advantages are available by reason of close coöperation with the State Division of Game and Inland Fisheries and the opportunity to observe developments in wildlife management on the following areas: Mount Mitchell Game Preserve, Resettlement Sandhill Project, Soil Conservation Service projects, Mattamuskeet Water Fowl Preserve, and preserves in the Piedmont and on the Coastal Plain.

CURRICULUM IN WILDLIFE CONSERVATION AND MANAGEMENT

Freshman Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Composition, Eng. 101, 102, 103	3	3	3
General Inorganic Chemistry, Chem. 101, 102, 103	4	4	4
Mathematical Analysis, Math. 100 a, b, c	3	3	3
General Zoology, Zool. 101	4	0	0
Economic Zoology, Zool. 102	0	4	0
Physical Geology, Geol. 120	0	0	4
Economic History, Hist. 101, 102, 103	3	3	3
Elementary Wildlife Management, Zool. 113	0	0	1
Military Science I, Mil. 100, or alternate	2	2	2
Fundamental Activities and Hygiene, P.E. 101, 102, 103	1	1	1
	20	20	21

Sophomore Year

Botany, General and Systematic, Bot. 101, 102, 203	4	4	3
Introduction to Organic Chemistry, Chem. 221	0	0	4
Introduction to Economics, Econ. 205	0	3	0
Land Economics, Agr. Econ. 212	0	0	3
Public Speaking, Eng. 231	3	0	0
Comparative Anatomy, Zool. 222-223	0	4	4
General Field Crops, F.C. 202	0	3	0
Ornithology, Zool. 251-252-253	2	2	2
Plant Propagation and Nursery Practice, Hort. 301	3	0	0
Surveying, Theoretical, C.E. 221, 222	3	3	0
Surveying, Field, C.E. 225	1	0	0
Principles of Forestry, For. 111	3	0	0
Military Science II, Mil. 200, or alternate	2	2	2
Sport Activities, P.E. 201-202-203	1	1	1
	22	22	19

Junior Year

Plant Ecology, Bot. 441	3	0	0
Field Zoology, Zool. 433	0	0	4
General Bacteriology, Bot. 402	0	4	0
Economic Entomology, Zool. 213	0	0	4
Animal Physiology, Zool. 202	0	0	5
Wildlife Conservation, Zool. 321-322-323	3	3	3
Technical Writing II, Eng. 232	0	3	0
Soils, Soils 201	4	0	0
Elective Social Science	3	0	0
Electives	6	9	3
	19	19	19

Senior Year

Elective English	3	0	0
Wildlife Management, Zool. 451-452-453	3	3	3
Dendrology, Bot. 211, 213	3	0	3
Advanced Plant Ecology, Bot. 453	0	0	3
The Soils of North Carolina, Soils 312	0	3	0
Advanced Animal Ecology, Zool. 462-463	0	3	3
Parasitology, Zool. 492-493	0	3	3
Electives	9	6	3
	18	18	18

THE AGRICULTURAL EXPERIMENT STATION

I. O. SCHAUB, *Acting Director*

Establishment.—The Agricultural Experiment Station was established in accordance with an Act of the General Assembly of 1877. Its progress has been enhanced by different Acts of Congress giving to the Station additional funds in 1877, 1906, 1925, and 1935. These Acts are known as Hatch, Adams, Purnell, and Bankhead-Jones, respectively. The General Assembly has allocated to the Station annually certain funds from revenue collected by the State Department of Agriculture from taxes on fertilizers and feeds.

Purpose.—The purpose of the Agricultural Experiment Station is to study methods for economic production of the highest grades of livestock, poultry, and plants on the many soil types and varied conditions existing throughout the commonwealth; to study methods for the control of parasitic insects and organisms that cause serious economic losses of animals, poultry, and plants; to find and develop varieties of animals, poultry, and plants, new, and resistant to diseases and the changeable conditions prevailing in this State; and to perfect better marketing for all agricultural products.

Work.—The staff of the Agricultural Experiment Station conducts experiments throughout the State on areas owned by farmers, on six strategically located test farms, on farms rented for short periods, and in the greenhouses and laboratories of the College.

Research.—The agricultural research aims, through the discovery of new facts, to improve the well-being of farmers throughout the State; to strengthen the regulatory work of the State Department of Agriculture; to develop new and necessary facts for the teaching of sound agricultural principles by vocational agricultural instructors, agricultural extension agents, and agricultural instructors in the College.

Experts.—The Agricultural Experiment Station staff brings to the College many experts, whose teachings in many specialized fields of agriculture assure the maintenance of curricula of high standards. It contributes much to the advanced training of students who are destined to become the leaders, teachers, and investigators so necessary in the maintenance of agriculture on sound and economic planes.

Publications.—The Agricultural Experiment Station publishes many bulletins and scientific papers on results of research conducted by the staff. These are free and sent upon request to anyone in the State.

Problems.—The staff diagnoses and interprets many problems for the farmers of this State; holds council with farmers and others interested in the agricultural industry; discusses farming procedures over the radio, and writes many letters on the more specific problems of agriculture at the request of farmers, members of garden clubs, and of fertilizer fungicide, and insecticide manufacturers. It takes part in many of the administrative functions of the College.

COOPERATIVE AGRICULTURAL EXTENSION WORK

DR. I. O. SCHAUB, *Director*
JOHN W. GOODMAN, *Assistant Director*
DR. JANE S. MCKIMMON, *Assistant Director*
RUTH CURRENT, *State Home Demonstration Agent*

Support.—The Agricultural Extension Service of State College is conducted coöperatively with the United States Department of Agriculture and the one hundred counties of the State. The work is supported by Federal funds derived from the Smith-Lever Act of 1914, the Capper-Ketcham Act of 1928, and the Bankhead-Jones Act of 1935, from State appropriations and county appropriations. The Federal and State appropriations are used to maintain an administrative and specialist staff, and to supplement salaries and travel expenses of county Extension agents.

Purpose.—The purpose of the Extension Service is to teach by demonstration. In carrying out this purpose, the College maintains a staff of trained specialists, a system of county agents and assistant agents, and a corps of home-demonstration agents. Instruction is given at group meetings by method and result demonstrations and by the written word by training leaders, and through organized effort with clubs of men, women, and young people. In all of these activities, the plan is to carry to the rural people of North Carolina the latest and best information obtainable for the building of a more prosperous and satisfying life on the farm. The Extension Service holds a number of short courses, both on the College campus and elsewhere over the State, that the greatest number of rural leaders may be trained for building better homes and better farms, in the use of more efficient practices, thus creating a more satisfying way of life.

THE SCHOOL OF ENGINEERING

BLAKE R. VAN LEER, M.E., *Dean of Engineering*
WALLACE C. RIDDICK, C.E., LL.D., *Dean Emeritus of Engineering*
WILLIAM L. MAYER, M.S., *Director of Registration*

Organization

The School of Engineering of the North Carolina State College of Agriculture and Engineering of the University of North Carolina is organized for purposes of administration into the following Departments:

Line Departments

	Administration Officer
Architectural Engineering	PROFESSOR ROSS SHUMAKER
Ceramic Engineering	PROFESSOR A. F. GREAVES-WALKER
Chemical Engineering	PROFESSOR E. E. RANDOLPH
Civil Engineering	PROFESSOR C. L. MANN
Electrical Engineering	PROFESSOR WILLIAM HAND BROWNE, JR.
Geological Engineering	PROFESSOR J. L. STUCKEY
Industrial Engineering	PROFESSOR H. B. SHAW
Mechanical Engineering	PROFESSOR L. L. VAUGHAN

Service Departments

Engineering Experiment Station	PROFESSOR HARRY TUCKER
Engineering Mechanics	PROFESSOR G. WALLACE SMITH
Mathematics	PROFESSOR H. A. FISHER
Physics	PROFESSOR C. M. HECK
Pilots and Mechanics Training Dept.	DIRECTOR L. R. PARKINSON

The School of Engineering is organized to offer technical and professional engineering instruction on the higher levels, graduate and undergraduate, vocational and professional, to meet the needs of the people of North Carolina. It is also organized and equipped to conduct research in the basic fundamentals of Engineering, and it coöperates with the College Extension Division in offering extension courses in Engineering and its allied fields.

Effective July 1, 1938, the consolidation of Engineering instruction at the University Unit in Raleigh was consummated, and the instructional staff and laboratory facilities were enhanced by additions from the Engineering College formerly maintained by the Unit at Chapel Hill. This gives the School of Engineering in Raleigh the largest and most extensive engineering staff and equipment in this section of the country, and offers to the young men of North Carolina excellent facilities for securing an undergraduate education in Engineering.

The excellence of the instruction in the School of Engineering is attested by the fact that the Engineers' Council for Professional Development has accredited its curricula in Ceramic, Civil, Electrical, and Mechanical Engineering. It is the policy of the School of Engineering to have all of its curricula meet the standards of this nationally recognized accrediting agency. Engineering education requires extensive laboratory facilities, and as rapidly as funds are available all of its laboratories are being brought into shape to meet the highest standards attained in any technological institution of higher learning.

Location and Facilities

Raleigh is a particularly favorable place for the study of Engineering. It is not only the State Capital where are located many State Departments of interest to engineers, such as the State Highway Commission, State Board of Health, State Geologist, Department of Conservation and Development, and other important State institutions, but it is a rapidly growing city marked by modern developments in residential, commercial, and municipal construction. This local building and engineering goes on the year round and affords excellent opportunities for observation and study. Raleigh is also so situated geographically that it is within easy distance for inspection trips to commercial chemical works, woodworking mills, railway shops, machine shops, airports, and manufacturing industries.

Raleigh is also a center from which electric power is distributed to a large section of the State. A transformer and meter substation adjoins the campus, and from it high-tension lines radiate in four directions. Hydroelectric and steam-electric plants on the Cape Fear River are within easy reach. The important systems of highways centering in Raleigh are exceptionally valuable for the observation and study of the construction, use, and maintenance of roads.

On the State College campus are five large buildings devoted exclusively to engineering instruction and research. These buildings contain much laboratory equipment which can be inspected at any time, but is best seen during the Engineers' Fair, which is held each year in April.

Purposes of the School

The purposes of the School of Engineering are: to educate men for professional service in Aeronautical, Architectural, Ceramic, Chemical, Civil, Construction, Electrical, Geological, Highway, Industrial, Mechanical, and Sanitary Engineering; to equip them to participate in commercial and public affairs; to develop their capacities for intelligent leadership; to aid in the development of commerce and industry through research and experimentation, to investigate natural resources and demonstrate their value to the people of the State; to coöperate with private companies, municipalities, public authorities, and commercial and industrial organizations through scientific research, thus increasing technical skill, improving the value of manufactured products, and eliminating waste.

Occupations Open to Graduates

Those who graduate and receive a bachelor's degree in some specialized branch of engineering are equipped to assume at once the duties and responsibilities usually given Junior Engineers. The graduates of the School of Engineering are found in many technical fields, but most of them find employment in some one of the following: Aviation, Architectural and Structural Engineering, the Ceramic Industries, the Chemical Industries, Private Professional Practice, Consulting Engineers, Hydroelectric Engineering, Electrical Manufacturing, Contracting, Central Electric Station Design and Construction, Telephone Service, Maintenance and Operation of Electrically-driven Mill Equipment, Lighting, Illumination, and Railway Signaling; Construction, Maintenance, and Operation of Steam and Electrical Railways, the Design and Manufacture of Machinery, the Operation of Shops, and the Furniture Industry; Geological Engineering, Highway Engineering, Industrial Engineering, and the Management of Industries, Municipal Engineering, Sanitary Engineering, and as City Managers, Public Utility and Health Service Officials; Sales Engineering, Research Engineering.

Curricula

The School of Engineering offers curricula which lead to the Bachelor's degree in the following specialized fields of Engineering:

Architectural Engineering
Ceramic Engineering
Chemical Engineering
Civil Engineering, with options in:
  (a) Construction
  (b) General Civil
  (c) Highway
  (d) Sanitary
Electrical Engineering, with options in:
  (a) Power Generation and Distribution
  (b) Electrical Communication
Geological Engineering
Industrial Engineering
Mechanical Engineering, with an option in Aeronautical Engineering.

All of the curricula contain courses of general educational value which prepare students for the duties of citizenship in a democracy. However, the curricula are primarily technical and practical, and designed to prepare young men for professional practice and for definite vocations as well as for leadership in the industrial advancement of the State.

The instruction is such as will foster the individual talent, imagination, and initiative of students, and instill in them ideals of accomplishment, service, and good citizenship, while assuring to them that scientific education

and practical training which will prepare them for professional service and leadership in engineering and in industry. In this way the School of Engineering aids in the advancement of commerce and industry and furthers the development and economic utilization of the State's resources for the general welfare.

All the engineering curricula emphasize thoroughness in the study of English and of the sciences—Mathematics, Physics, and Chemistry—with a thorough drill in the application of fundamental principles to engineering and industrial problems. Engineering is taught as a profession, and the students come to realize that it is both honorable and learned, and that it offers exceptional opportunities for service.

The several engineering curricula have a common freshman year and differ only slightly in the sophomore year, in which years the students study English, Mathematics, Drawing, Shopwork, Physics, and Chemistry. In the junior and senior years the students are directed definitely to the professional aims in carefully considered and well-balanced curricula.

Summer Work.—At least six weeks of summer employment, approved by the Head of the Department in which the student is enrolled, preferably in the summer following the junior year, is a specific requirement for graduation in Engineering.

The purpose of this is to have every student before graduation acquire the valuable experience of actual work with responsibility and pay in the field of his vocation. Departmental advisers will aid students in getting summer employment.

Inspection Trips.—In order to familiarize himself with the practice of his profession, each senior in Engineering is required as a part of his curriculum to take the departmental inspection trips. None will be excused except for grave reasons.

These inspection trips are arranged by the Head of the Department in which the student takes his major work. The cost of such trips vary from $25.00 to $60.00 per student, depending on the time and distance traveled.

Degrees.—Upon the satisfactory completion of one of the curricula in engineering the Bachelor's degree in the specialized branch of Engineering is conferred.

The Master's degree in Engineering is offered for the satisfactory completion of one year of graduate study in residence. Candidates for the Master's degree in Engineering enter and are enrolled as graduate students.

The professional degree of Architectural Engineer, Ceramic Engineer, Chemical Engineer, Civil Engineer, Electrical Engineer, or Mechanical Engineer, may be conferred upon graduates after five years professional practice in responsible charge of important work, and upon the acceptance of a thesis on a subject related to the practice in which the applicant has been engaged. For detailed information concerning a graduate or professional

degree write Dr. R. F. Poole, Chairman of the Graduate Committee, State College Station, Raleigh, N. C.

Graduation.—The requirements for graduation in a specialized branch of Engineering are the satisfactory completion of all the courses in one of the prescribed curricula (see tabulations of curricula on the pages following), a total of not less than 240 term credits, with not less than 240 honor points.

Of the minimum of 240 term credits required for graduation in Engineering, 117 are common to all curricula: 30 term credits in Mathematics, 18 in Language, 9 in Economics, 12 in Chemistry, 12 in Physics, 9 in Mechanics, 9 in Drawing and Descriptive Geometry, 12 in Military Training and 6 in Hygiene and Physical Education.

Each of the curricula permits election of at least 18 term credits and contains not more than 72 special technical term credits.

Graduates in Liberal Arts.—Selected courses leading to the Bachelor's degree in Engineering are offered to graduates of recognized science universities and colleges of liberal arts. These courses may be arranged to meet the vocational needs of the individual student, and in the light of credits accepted from the institution from which the student has been graduated. In some cases where the student presents enough credits which may be used for courses required in his engineering curriculum, he may be graduated with a Bachelor's degree from the School of Engineering in one year. In no case should it take more than two years to complete the work for his Bachelor's degree in Engineering.

Short Courses: Institutes.—The School of Engineering coöperates with the College Extension Division in offering short courses and institutes for adults and graduate engineers. These courses vary in length from one day to one week, and each year the courses covered are different and vary according to the public demand. The faculty of the School of Engineering usually furnishes a large portion of the instruction offered in these courses, which in the past have been for Electrical Metermen, Gas Plant Operators, Waterworks Operators, Heating and Plumbing Contractors, Surveyors, Engineers. These short courses are usually held at Raleigh because the School of Engineering has unusual laboratory and classroom facilities which offer a decided advantage to those who desire to "brush up on" their specialty and bring themselves abreast of the times by attending such short courses. For information concerning any short course in which a reader may be interested, he is requested to address his inquiry to Mr. Edward Ruggles, Director, Extension Division, State College, Raleigh, N. C.

Admission: Advanced Standing.—Regulations for admission and advanced standing are stated under Information for Applicants.

AVIATION PILOTS AND MECHANICS TRAINING SCHOOL

In coöperation with the Civil Aeronautics Authority, the National Youth Administration, and Serv-Air Inc., the School of Engineering is offering to young men between the ages of 18 and 25 an opportunity to become licensed pilots and mechanics.

Students wishing to receive flying instruction must pass a physical examination comparable to the standards required by the U. S. Army Air Corps.

It is necessary that all flying students attend the ground-school course being offered. Navigation, meteorology, and the Civil Air Regulations are the subjects which must be mastered before the student may obtain a private flying license. Approximately 2½ hours of ground instruction to every hour in the air is required. The instruction during the 35 hours of flying is of prime importance; and to insure the best results, each student who has soloed will receive 30 minutes of check instruction for each hour of solo flying.

For detailed information, inquiries should be addressed to Professor L. R. Parkinson, Page Hall, North Carolina State College, Raleigh, North Carolina.

Each of these curricula is not only well balanced, but offers a liberal course of study in a technical and professional field. They conform to what is regarded by engineering educators as the best modern practice.

Also offered in the School of Engineering is a curriculum leading to the Bachelor of Science degree in Engineering (see page 94). This curriculum has no specialization and requires but 231 term credits with at least 231 honor points. It is recommended to those who desire a broad general training in the basic principles of Engineering but who do not have the time or desire to specialize in some particular branch.

FRESHMAN YEAR OF ALL CURRICULA IN ENGINEERING

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Algebra, Trigonometry, Analytical Geometry, Math. 101, 102, 103	6	6	6
Composition, Eng. 101, 102, 103	3	3	3
General Inorganic Chemistry, Chem. 101, 102, 103	4	4	4
Engineering Drawing II, M.E. 105, 106	3	3	0
Descriptive Geometry, M.E. 107	0	0	3
Military Science I, Mil, 101, 102, 103, or World History, Hist. 104	2	2	2
Fundamental Activities and Hygiene, P.E. 101-2-3	1	1	1
	19	19	19

Summer requirement following the freshman year in Architectural, Ceramic, and Electrical Engineering:

Surveying:—C.E. s102, 3 credits.

ARCHITECTURAL ENGINEERING

Professor: Ross Shumaker, B. Arch., Registered Architect; Head of the Department.

Associate Professor: Jehu Dewitt Paulson, B.F.A.
Assistant Professor: James M. Edwards, Jr., B.F.A., Registered Architect.
Instructor: Herman R. McLawhorn, Jr., B.S., B.F.A.

Equipment and Curriculum.—The Architectural Engineering Department occupies the third floor of Daniels Hall, an excellent location providing adequate space for present needs and for future expansion. Large drawing rooms, lecture room, photographic dark room, offices and so forth, overlooking the entire State College Campus, constitute an ideal physical layout for the department.

This curriculum is arranged to lay a broad foundation for subsequent professional life. A professional man should have a liberal education as well as fundamental technical knowledge. This curriculum offers arts and sciences in their relation to Architecture. It embodies the idea that Architecture is an art as well as a useful industry.

Architecture is generally recognized as one of the first and with textiles, in utility, greatest of the fine arts; hence, it requires sympathy with every form of culture. The practice of the profession presents many aspects of an exacting and thoroughly scientific nature; the training of the architect must combine those things which are useful with those that are purely ornamental. The aim is to train men for the practice of their profession, and the curriculum is designed so that a balance may be maintained between the practical and the aesthetic.

Facility in the technique of drawing is emphasized, and meticulous care and exactitude are demanded in the treatment of the various fundamental problems of construction.

Students in Architectural Engineering are required to register with the Beaux Arts Institute of Design of New York City, and to execute problems projected by that institute. They compete on equal footing with students taking purely architectural courses in other schools and, to the credit of our students, have received frequent honorable mentions in these competitions.

Graduates in Architectural Engineering have little difficulty in normal times in acquiring employment and experience such that in a few years they can obtain registration as licensed architects and establish themselves in their profession.

CURRICULUM IN ARCHITECTURAL ENGINEERING

Freshman Year

For the freshman year, refer to page 75.

Surveying, C.E. s200, 3 credits, is required in the summer immediately following the freshman year.

Sophomore Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Differential Calculus, Integral Calculus I and II, Math. 201, 202, 203	4	4	4
*Business English, Public Speaking and English or American Literature, Eng. 211, 231, (261 or 262 or 263) or (265 or 266 or 267)	3	3	3
Physics for Engineers, Phys. 201, 202, 203	4	4	4
Engineering Mechanics, E.M. 311, 312	0	3	3
Elements of Architecture I, II, III, Arch. 201, 202, 203	3	3	3
Shades and Shadows, Arch. 205	2	0	0
Elementary Rendering, Arch 204	1	0	0
†Military Science II, Mil. 201, 202, 203	2	2	2
Sport Activities, P.E. 201, 202, 203	1	1	1
	20	20	20

Junior Year

Engineering Mechanics, E.M. 313	3	0	0
Strength of Materials, E.M. 321, 322	0	3	3
Materials Testing Laboratory, H.E. 332	0	1	0
Materials of Construction, C.E. 321	3	0	0
Sanitary and Mechanical Equipment of Buildings, C.E. 364	3	0	0
Woodworking, M.E. 127	0	3	0
Business Law, Econ. 307	0	0	3
Freehand Drawing I, II, and III, Pen and Pencil, Water Color, Charcoal, Arch. 101, 102, 103	2	2	2
Architectural Details, Arch 305	0	0	2
Practical Photography, Arch. 304	0	0	1
Perspective Drawing, Arch. 206	0	2	0
Architectural Design B-1, B-2, B-3, Arch. 301, 302, 303	3	3	3
History of Architecture I, II, Arch. 321, 322	3	3	0
History or Ornament, Arch 404	0	0	3
Electives	3	3	3
	20	20	20

Summer requirement: six weeks industrial employment.

Senior Year

Reinforced Concrete, C.E. 421, 422	3	3	0
Graphic Statistics, C.E. 425	1	0	0
Theory of Structures, C.E. 431a, 432a	3	3	0
Specifications, C.E. 467	0	0	3
Electrical Equipment of Buildings, E.E. 343	0	0	3
General Economics, Econ. 201, 202, 203	3	3	3
Advanced Rendering, Arch. 311, 312, 313	1	1	1
Architectural Design A-1, A-2, A-3, Arch. 401, 402, 403	3	3	3
Domestic Architecture, Arch. 406	0	2	0
Architectural Office Practice, Arch. 411, 412, 413	2	2	2
Architectural Composition, Arch 407	2	0	0
Architectural Estimates, Arch. 403	0	0	2
Electives	3	3	3
	21	20	20

All seniors will be required to go on the inspection trip as part of their curriculum.

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* Students who have been certified by the Department of English as proficient in English may substitute for the course listed French, M.L. 101. Those who substitute M.L. 101 for the sophomore English will have to elect M.L. 201 in junior or senior year to complete the requirement of two years of a Modern Language.

† Or 6 credits in one or two of the following departments: Economics, Psychology, History, Modern Language, Sociology.

CERAMIC ENGINEERING

Professor: A. F. Greaves-Walker, Cer.E., D.Sc., Head of the Department
Instructor: R. L. Stone, M.S.
Teaching Fellow: J. J. Amero, B.S.

The Department of Ceramic Engineering occupies its own building, which contains classrooms, a design room, a chemical laboratory, an equipment laboratory, and a kiln laboratory.

The Equipment Laboratory contains an adequate variety of machines for preparing and processing ceramic bodies of all kinds and making ceramic products on a laboratory scale. It also contains the necessary equipment for carrying on ceramic research and the testing of materials and products.

The Kiln Laboratory contains eleven kilns and furnaces of different types, which provide for the firing or testing of all ceramic materials and products.

Ceramic Engineering includes the different phases of engineering which have to do with the study of the non-metallic minerals, except fuels and ores as such, and the manufacture of products therefrom. The non-metallic minerals compose over 90 per cent of the earth's surface, and the industries based on them rank above the automobile, and the iron and steel industries in value of product. Principal among these products are those made of clay and associated minerals, such as building brick, hollow tile, sewer pipe, refractories, wall and floor tile, tableware, pottery, electrical porcelain, chemical and sanitary stoneware, flat glass, chemical and table glassware, enameled iron and steel, Portland and hydraulic cements, and limes.

North Carolina has enormous deposits of shale, clay, kaolin, feldspar, sand, limestone, and other ceramic minerals, equal in quality to any others in the United States, and with the introduction of modern processes and methods will produce in the future quantities of ceramic products and adequately develop its ceramic industries.

The demand for ceramic engineers has far exceeded the supply for a number of years past, there being less than 100 ceramic engineers graduated in the United States each year. It is with the idea of supplying this demand and developing the latent resources of North Carolina that a four-year curriculum in Ceramic Engineering, leading to the degree of Bachelor of Ceramic Engineering, is offered.

The instruction in Ceramic Engineering is enriched by the intensive investigation of ceramic resources and manufactures constantly under way in connection with the Engineering Experiment Station. Students will have the great advantage of these investigations along with their other instruction.

Courses in advanced subjects for graduate students are offered in Advanced Refractories and Furnaces, Industrial Adaptability of Clays, Designing of Ceramic Equipment and Plants, Advanced Silicate Technology, Glass Technology, and Ceramic Research.

The curriculum in Ceramic Engineering, which has been accredited by the Engineering Council for Professional Development, contains fundamental courses, and courses in Ceramic, Geological, Civil, Electrical, and Mechanical Engineering, as well as in Economics, to provide for the general training in engineering with the particular study of Ceramic Engineering. The Ceramic Engineering courses consist of the theoretical and practical study of the mining, manufacturing, and testing of ceramic materials and products as well as the design of ceramic equipment and plants.

Graduates in Ceramic Engineering are employed in the ceramic industries as plant executives, research engineers, plant-control engineers, sales engineers, product-control engineers, plant designers and constructors, equipment manufacturers, consulting engineers and ceramic chemists, and technologists. Graduates of the Department at State College, which now ranks fourth in registration in the United States, are successfully holding positions in all of these branches.

CURRICULUM IN CERAMIC ENGINEERING

Freshman Year

For the freshman year, refer to page 75.

Surveying, C.E. s200, 3 credits, is required in the summer immediately following the freshman year.

Sophomore Year

COURSES	CREDITS First Term	Second Term	Third Term
Differential Calculus, Integral Calculus, I and II, Math. 201, 202, 203	4	4	4
Qualitative Analysis, Chem. 211	4	0	0
Quantitative Analysis, Chem. 212	0	4	0
Physics for Engineers, Phys. 201, 202, 203	4	4	4
Engineering Geology, Geol. 220	3	0	0
Mineralogy, Geol. 230	0	0	3
*Business English, Public Speaking, and English Literature, Eng. 211, 231, 251	3	3	3
Ceramic Materials, Cer.E. 102	0	3	0
Ceramic and Mining Processes, Cer.E. 103	0	0	3
†Military Science II, Mil. 201, 202, 203	2	2	2
Sport Activities, P.E. 201, 202, 203	1	1	1
	21	21	20

Junior Year

Engineering Mechanics, E.M. 301, 302	3	3	0
Strength of Materials, E.M. 321	0	0	3
General Economics, Econ. 201, 202, 203	3	3	3
Mechanical Drawing, M.E. 211, 212	0	2	2
Drying Fundamentals and Practice, Cer.E. 201	3	0	0
Firing Fundamentals and Practice, Cer.E. 252	0	3	0
Ceramic Calculations, Cer.E. 253	0	0	3
Ceramic Products, Cer.E. 203	0	0	3
Heat Engineering III, M.E. 301, 302	3	3	0
Mechanical Engineering Laboratory I, M.E. 311, 312	1	1	0
Materials Testing Laboratory, H.E. 332	0	0	1
Thermal Mineralogy, Geol. 338	0	3	0
Physical Chemistry, Chem. 231	5	0	0
Business Law, Econ. 307	0	0	3
Electives	3	3	3
	21	21	21

Summer requirements: six weeks industrial employment.

Senior Year

Refractories, Cer.E. 403	0	0	3
Metal Enamels, Cer.E. 302	0	3	0
Silicate Bodies and Glasses, Cer.E. 301	3	0	0
Ceramic Laboratory, Cer.E. 311, 312, 313	3	3	3
Ceramic Designing, Cer.E. 314, 315	0	4	4
Pyrometry, Cer.E. 305	1	0	0
Technical Writing I, Eng. 321	3	0	0
Elements of Electrical Engineering I, E.E. 321, 322	0	3	3
Strength of Materials, E.M. 322	3	0	0
Optical Mineralogy, Geol. 431, 432, 433	3	3	3
Electives	3	3	3
	19	19	19

All seniors will be required to go on the inspection trip as part of their curriculum.

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* Students who have been certified by the Department of English as proficient in English may substitute for the courses listed Elementary German, M.L. 102. Such students are required to take two years of German.

† Or 6 credits in one or two of the following departments: Economics, Psychology, History, Modern Language, Sociology.

CHEMICAL ENGINEERING

Professor: E. E. Randolph, Ph.D.; Head of the Department
Associate Professors: D. B. Wicker, Ph.D.; B. E. Lauer, Ph.D.
Assistant Professors: W. G. Van Note, M.S.; F. S. Johnson, M.S.
Teaching Fellow: R. P. Harris, B.S.
Secretary to Department: Miss Lucille Joyner

Facilities.—The laboratories of the Department of Chemical Engineering occupy the ground floor of Winston Hall. The available space has been divided into an exhibit room; Water and Engineering-Materials Laboratory; Electrochemical Engineering Laboratory; Fuel- and Gas-Technology Room; Oil and Hydrogenation Laboratory; Experimental Rayon Plant; Destructive Distillation Installation; Dark Room for metallographic and microphotographic study; the Graduate Research Laboratory; Unit-Processes Laboratory; Plant- and Equipment-Design Laboratory; Cellulose Laboratory. After September, 1939, Winston Hall will be entirely reconditioned for the Chemical Engineering Department.

The Chemical Engineering laboratories have suitable equipment, much of it specially designed, for the study of the main processes and plant problems of the chemical engineering industries. They are supplied with direct and alternating current, gas, water, steam, compressed air, electric motors, generators, and storage batteries. They are equipped with precision and control instruments, such as refractometer, surface-tension apparatus, polariscope, potentiometer, microscope, colorimeter, calorimeters, tint-photometer, thermocouples, and optical pyrometer. They are equipped also with filter presses, centrifuges, crushers, grinders and pulverizers, vacuum pan, stills, autoclave, jacketed kettle, gas, water, and electrical meters, equipment designed and built, such as double-effect evaporators, heat exchangers, flow-of-fluid experimental equipment for orifice, venturi, pitot, weir gauges, column still, absorption tower, crystallizer, rotary and tunnel driers, gas furnace, resistance and arc electric furnace, and humidifier. An experimental refinery and hydrogenation plant for vegetable and other oils has been installed. A complete permutit water-softening equipment forms a unit of an experimental water-purification and -treatment system. In addition, the industrial plants of the City offer opportunity for study of plant operation and problems.

There has been recently added to the Department of Chemical Engineering a valuable exhibit room, where products of many of the Chemical Engineering industries are exhibited. These exhibits, used for instruction, serve to give the student very valuable training. They are arranged in the form of flow sheets showing the various steps in manufacturing processes.

The Department Shop is supplied with machines and tools for building and repairing equipment.

Curriculum.—This curriculum provides thorough training in unit operations and unit processes, and in the methods of manufacturing industrial chemical products on a large scale. It includes basic courses in Chemistry,

Physics, Mathematics, and fundamental Engineering as a background for the professional Chemical Engineering training of this department, so that the graduate is prepared to enter any field of applied chemical work as a junior engineer.

The Chemical Engineer is expected to determine the process, the material, the design, and the economic capacity of the equipment needed. Efficient production requires exact control in every stage of the process. He must devise efficient and economical methods, discover sources of loss and the remedy, recover by-products, convert waste products and make industrial calculations of input, output, efficiency, quality, and cost.

North Carolina is a center of chemical industries in the South, with an annual output estimated at approximately one-fourth billion dollars. Some of the largest chemical industries of the country are located in this State, manufacturing such products as paper, fertilizers, vegetable oils, food products, leather, rubber goods, aluminum, metallurgical products, paints and varnishes. Such industries require properly trained Chemical Engineers. Chemical Engineering offers therefore inviting opportunities in this profession which renders a distinct service to the welfare and comfort of the people.

Graduates find employment in such fields as control work and industrial research; as technologists, superintendents of chemical industries, municipal engineers, engineers in the State and Federal health service, consulting chemical engineers, manufacturers of chemicals and of chemical equipment, chemical salesmen and representatives, developers of new chemical industries.

Ninety-three per cent of the graduates of this Department are successfully engaged in Chemical Engineering work. Because chemical problems are intricate and scientific chemical-control work in industries is required, salaries for Chemical Engineering graduates are inviting. Many graduates of this Department now hold very responsible positions. It has not been possible to supply the demand for graduates.

The Department coöperates with the State Departments in their chemical problems. Facilities are available for graduate work, upon which emphasis is placed. Applicants for the Master's degree are registered in the Graduate Department of the College.

CURRICULUM IN CHEMICAL ENGINEERING

Freshman Year

For the freshman year, refer to page 75.

Sophomore Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Differential Calculus, Integral Calculus I and II, Math 201, 202, 203	4	4	4
*Business English, Public Speaking, and English or American Literature, Eng. 211, 231, any one of (261-267)	3	3	3
Introduction to Chemical Engineering, Chem.E. 201, 202, 203	1	1	1
Physics for Engineers, Phys. 201, 202, 203	4	4	4
Qualitative Analysis, Chem. 211	4	0	0
Quantitative Analysis, Chem. 212, 213	0	4	4
Shopwork, M.E. 121, 122, 123	1	1	1
†Military Science II, Mil. 201, 202, 203	2	2	2
Sport Activities, P.E. 201, 202, 203	1	1	1
	20	20	20

Junior Year

Engineering Mechanics, E.M. 301, 302	3	3	0
Strength of Materials, E.M. 320	0	0	3
Organic Chemistry, Chem. 321	4	4	4
Chemical Engineering I, Chem.E. 311, 312, 313	3	3	3
Industrial Stoichiometry, Chem.E. 310	0	0	3
Chemical Engineering Laboratory I, Chem.E. 321	1	1	1
Physical Chemistry, Chem. 331	4	4	0
Fluid Mechanics, E.M. 330	0	0	3
Elements of Electrical Engineering I, E.E. 321, 322	3	3	0
Machine Shop I, M.E. 225, 226	1	1	0
Electives	3	3	3
	22	22	20

Summer requirement: six weeks industrial employment.

Senior Year

Principles of Chemical Engineering, Chem.E. 441	3	3	3
Water Treatment, Chem.E. 421	3	0	0
Chemistry of Engineering Materials, Chem.E. 422	0	3	0
Electrochemical Engineering, Chem.E. 423	0	0	3
Chemical Engineering Lab. and Design II, Chem.E. 431	2	2	2
Heat Engineering III, M.E. 301, 302	3	3	0
Mineralogy, Geol. 230	0	0	3
General Economics, Econ. 201-2-3	3	3	3
Elementary Modern Physics, Phys. 307	3	0	0
‡Technical Writing I, Eng. 321	0	3	0
‡Business Law, Econ. 307	0	0	3
Electives	3	3	3
	20	20	20

All seniors will be required to go on the inspection trip as part of their curriculum.

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* Students who have been certified by the Department of English as proficient in English may substitute for the courses listed German, M.L. 102. Such students are required to take two years of German.

† Or 6 credits in one or two of the following departments: Economics, Psychology, History, Modern Language, Sociology.

‡ With the approval of the advisor, courses in Education, English, History, German, Advanced Mathematics, Botany, and Library Methods may be substituted for Technical Writing, and Business Law.

CIVIL ENGINEERING

Professors: C. L. MANN, C.E., *Head of Department*
B. R. VAN LEER, M.E.
W. C. RIDDICK, LL.D.
HARRY TUCKER, C.E.
W. G. GEILE, Ph.B.
T. S. JOHNSON, C.E.
Assistant Professors: C. R. BRAMER, E.M.
JAMES FONTAINE, M.S.
Instructor: C. M. LAMBE, B.E.

The Department of Civil Engineering is located in the Civil Engineering Building in which the offices, classrooms, laboratories, and instrument rooms were designed and built to provide suitable facilities for efficient teaching and laboratory demonstrations.

The equipment common to general civil engineering includes surveying instruments, transits, levels, plane tables, current meters, sextants, planimeters, calculating machines, blueprint apparatus, lantern slides, and moving-picture machine. Special equipment includes precise surveying instruments such as Beggs deformeter and others of this class.

The equipment in the Materials-Testing Laboratory, in the Cement- and Bituminous-Materials-Testing Laboratory, and in the Sanitary Laboratory, fully meet the present-day requirements for laboratory instruction.

Soil Mechanics is a new course in the curriculum. A laboratory for this course is being furnished and equipped with the newest apparatus now in use by laboratories engaged in the study of the action of soils relative to engineering problems dealing with structures, foundations, and highway subgrades.

Civil Engineering is the oldest and most general of all the branches of modern engineering; in fact, from it all of the others have developed. The usefulness of Civil Engineering is so well recognized that a student who does not have a strong predilection for some other special branch may be safely advised to study Civil Engineering.

The Civil Engineering curriculum in the School of Engineering has been accredited by the Engineers' Council for Professional Development and is a well-balanced course of study, upon the completion of which a young man is equipped to assume the duties of junior engineer in any of the following important fields: Design, construction, operation, or testing of water-power developments, railroads, highways, water supplies, sewerage systems.

The Civil Engineering department offers a student the choice of the following four options:

(a) General Civil
(b) Highway
(c) Construction
(d) Sanitary

The first two years of these curricula are the same. They begin to differentiate slightly in the junior year and more so in the senior year, but essentially they are the same and are designed to develop in the student engineer a well-trained mind, one which reasons logically, accurately, quickly. This is accomplished by a thorough training in applied mathematics and physics, which is supplemented with practical work in the field, drafting rooms, and laboratories.

More men are practicing Civil Engineering in North Carolina than all the other branches of engineering put together, and it is to train young men to serve under those already in the profession and subsequently to follow in their footsteps that the Civil Engineering curricula are offered.

The reasons for the various options in Civil Engineering are stated under the head of each.

CONSTRUCTION ENGINEERING

North Carolina's progress indicates great increase in building and general construction. Construction needs more and better trained men to meet the immediate demands as well as to anticipate the increased demands of the future. Builders, as few others, need to know at all times exactly where they stand on the projects they undertake. The contractor, to be successful, must conduct his business systematically and economically. Therefore he must learn not only general engineering technique, but also something of Architecture and business methods and practices; he must delve further into construction and learn the principles involved, the methods, practices, and successful policies in use.

Combined into this curriculum are the fundamental courses in the Civil Engineering curriculum, a few courses in Architecture, a few additional courses dealing with business, and special courses in Construction Engineering in the junior and senior years.

The theory in the Construction Engineering courses is supplemented by frequent inspection trips to projects under construction; particular emphasis is placed upon estimating, modern methods, and management of operations.

This curriculum is designed to prepare the student to enter the work of actual construction of modern structures and to lay a foundation for future work as owners, managers, or executives in the construction industry.

The equipment available for instruction in Construction Engineering consists of a large file of complete plans and specifications for various types of structures, many samples of different building materials, lantern slides illustrating methods of construction, and a comprehensive file of trade literature and publications. The equipment of the entire Department of Civil Engineering is available for instruction.

HIGHWAY ENGINEERING

North Carolina has, during the past twenty years, made remarkable progress in the building of good roads. Most of the counties and cities in the State have also spent large sums in road construction and maintenance.

The building of roads and their proper maintenance are engineering problems to be handled by technically trained men. Since Highway Engineering is, fundamentally, a special division of the broad field of Civil Engineering, the curriculum for the first three years is identical with the regular Civil Engineering curriculum. In the fourth year, however, the student who specializes in Highway Engineering is given more specific instruction in those subjects pertaining to Highway Engineering.

State College offers unusual opportunities to young men to study Highway Engineering. Not only are the necessary facilities available for theoretical instruction, but there are in and near Raleigh many opportunities for studying the practical application of the principles of highway construction. Raleigh and Wake County have built most of the different types of road surfaces; the laboratories of the State Highway and Public Works Commission are available for inspection, and numerous experimental sections of road periodically being constructed by the Commission near Raleigh can be examined.

The equipment at the College for instruction in Highway Engineering is fairly complete, and is constantly being added to and enlarged. The Materials-Testing Laboratory in the Civil Engineering Building is well-equipped for testing all materials used in road building; there is full field equipment for surveys, and modern drawing rooms provided with the necessary furniture and instruments. There is also a large lecture room fitted for the use of lantern slides and motion pictures.

SANITARY ENGINEERING

Because Sanitary Engineering so vitally concerns the health of the people, and because of the progress in North Carolina in this field, the demand for men trained in Sanitary Engineering has increased.

The Sanitary Engineering option is offered to meet this need. In the main it is the curriculum in General Civil Engineering with selected courses in Bacteriology, Chemical Engineering, and Sanitary Engineering.

As there is a large demand in this State for men familiar with the design and operation of water and sewage plants, special attention is given to the actual design and practical operation of water-purification and sewage-disposal plants.

The Sanitary Engineering Laboratory equipment is similar to that used in water- and sewage-plant laboratories; the student makes the same tests, using standard methods, as are made in water- and sewage-plant laboratories.

The City of Raleigh water-purification plant and the College gymnasium

swimming-pool filter plant are available for practical demonstration and instruction. Through the coöperation of the Bureau of Sanitary Engineering, State Board of Health, located in Raleigh, the student has an opportunity to study all phases of its work, not only in Sanitary Engineering, but also in the broad field of public health.

Upon graduation, students are prepared to hold positions as water- and sewage-plant operators, assistant resident engineers with private consulting engineers, junior engineers with State boards of health, and with the United States Public Health Service. After a few years of experience, graduates may be expected to advance to positions as superintendents of waterworks, city engineers and city managers, consultant engineers, State sanitary engineers, and senior engineers with the United States Public Health Service.

CURRICULUM IN CIVIL ENGINEERING

General Civil Engineering — **Construction Engineering**
Highway Engineering — **Sanitary Engineering**

Freshman Year

For the freshman year, refer to page 75.

Sophomore Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Differential Calculus, Integral Calculus I and II, Math. 201, 202, 203	4	4	4
*Business English, Public Speaking, Eng. 211, 231, and one term English or American Literature	3	3	3
Physics for Engineers, Phys. 201, 202, 203	4	4	4
Engineering Geology, Geol. 220	3	0	0
Theoretical Surveying, C.E. 221, 222, 223	3	3	3
Field Surveying, C.E. 225, 227	1	0	1
Mapping, C.E. 226	0	1	0
Engineering Mechanics, E.M. 311, 312	0	3	3
†Military Science II, Mil. 201, 202, 203	2	2	2
Sport Activities, P.E. 201, 202, 203	1	1	1
	21	21	21

Surveying, C.E. s310, concurrent with Summer School, 3 credits.

Junior Year

	Required		
Elements of Electrical Engineering I, E.E. 321, 322	3	3	0
Engineering Mechanics, E.M. 313	3	0	0
Strength of Materials, E.M. 321, 322	0	3	3
Materials of Construction, C.E. 321	3	0	0
	9	6	3

Choice must be made of one of the following options:

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* Students who have been certified by the Department of English as proficient in English may substitute for the courses listed French, M.L. 101. These students are expected to take two years of French.

† Or 6 credits in one or two of the following departments: Economics, Psychology, History, Modern Language, Sociology.

GENERAL CIVIL OPTION

Fluid Mechanics, E.M. 330	0	3	0
Hydraulics, C.E. 443	0	0	3
General Economics, Econ. 201, 202, 203	3	3	3
Highway Engineering, H.E. 322, 323	0	3	3
Heat Engineering III, M.E. 303	0	0	3
Technical Writing I, Eng. 321	3	0	0
Electives	3	6	3
	18	21	18

HIGHWAY OPTION

Fluid Mechanics, E.M. 330	0	3	0
Hydraulics, C.E. 443	0	0	3
General Economics, Econ. 201, 202, 203	3	3	3
Highway Engineering, H.E. 322, 323	0	3	3
Heat Engineering III, M.E. 303	0	0	3
Electives	6	6	3
	18	21	18

CONSTRUCTION OPTION

Fluid Mechanics, E.M. 330	0	0	3
General Economics, Econ. 201, 202, 203	3	3	3
Highway Engineering, H.E. 322, 323	0	3	3
Sanitary and Mechanical Equipment of Buildings, C.E. 364	3	0	0
Materials Testing Laboratory, H.E. 332, 333	0	1	1
Construction Engineering I, C.E. 361, 362, 363	3	3	3
Electrical Equipment of Buildings, E.E. 343	0	0	3
Electives	3	3	3
	21	19	22

SANITARY OPTION

Fluid Mechanics, E.M. 330	0	3	0
Hydraulics, C.E. 443	0	0	3
Highway Engineering, H.E. 322, 323	0	3	3
General Bacteriology, Bot. 402	0	4	0
Aquatic Biology, Bot. 414	0	0	2
Sanitary Engineering, C.E. 383	0	0	3
Treatment of Water and Sewage, Chem.E. 308	3	0	0
Technical Writing I, Eng. 321	0	0	3
Business Law, Econ. 307	3	0	0
Electives	3	3	3
	18	19	20

Senior Year

Required

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Reinforced Concrete, C.E. 421, 422	3	3	0
Soil Mechanics, C.E. 435	3	0	0
Theory of Structures, C.E. 431, 432	3	3	0
Structural Design, C.E. 426, 427	0	3	3
Graphic Statics, C.E. 425	1	0	0
	10	9	3

Choice must be made of one of the following options:

GENERAL CIVIL OPTION

Railroad Economics, C.E. 442	0	3	0
Transportation, H.E. 423	0	0	3
Applied Astronomy, C.E. 453	0	0	4
Materials Testing Laboratory, H.E. 332, 333	0	1	1
Waterworks, C.E. 485	3	0	0
Sanitary Engineering Laboratory, C.E. 481, 482	1	1	0
Sewerage, C.E. 486	0	3	0
Business Law, Econ. 307	0	0	3
Electives	6	3	6
	20	20	20

HIGHWAY OPTION

Transportation, H.E. 423	0	0	3
Applied Astronomy, C.E. 453	0	0	4
Materials Testing Laboratory, H.E. 332, 333	0	1	1
Highway Engineering II, H.E. 421, 422	3	3	0
Highway Office Practice and Design, H.E. 425, 426	1	1	0
Modern Language	3	3	3
Business Law, Econ. 307	0	0	3
Electives	3	3	3
	20	20	20

CONSTRUCTION OPTION

Construction Engineering II, C.E. 461, 462, 463	3	3	3
Construction Equipment, C.E. 468	0	3	0
Accident Prevention in Construction, C.E. 469	0	0	3
Specifications, C.E. 467	0	0	3
Economics or Social Sciences	3	3	3
Architectural Drawing, Arch 306	0	0	3
Electives	3	3	3
	19	21	21

SANITARY OPTION

Materials Testing Laboratory, H.E. 332, 333	0	1	1
Sanitary Engineering Laboratory, C.E. 481, 482	1	1	0
Waterworks, C.E. 485	3	0	0
Water Purification, C.E. 488	0	3	0
Sewerage, C.E. 486	0	3	0
Sewage Disposal, C.E. 489	0	0	3
General Economics, Econ. 201, 202, 203	3	3	3
Financing of Sanitary Utilities, C.E. 483	0	0	3
Electives	3	3	6
	20	23	19

Each senior is required to make the official engineering inspection trip.

DEPARTMENT OF ELECTRICAL ENGINEERING

Professors: WILLIAM HAND BROWNE, JR., A.B., P.A.E., B.E., Extra Ordinem; *Head of the Department*
JOHN E. LEAR, B.S., E.E.
RAYMOND SPIVEY FOURAKER, B.S. in E.E., M.S.
Associate Professor: ROBERT RODERICK BROWN, B.S., M.S.
Assistant Professors: ROBERT JAMES PEARSALL, B.E.
LEROY MONROE KEEVER, B.E., M.S.
KARL B. GLENN, B.E., M.S.
Instructor: EDWIN WEEMS WINKLER, S.B.
Laboratory Assistant: JOHN HARVEY NICHOLS, B.S.
Teaching Fellow: HUBERT LEE MORGAN, JR., B.S.

Buildings and Equipment.—The Department is housed in Daniels Hall. This is an L-shaped building, the main part of which is four stories of brick, stone and steel construction, with a two-story wing of shop construction, the sides of which are almost entirely of glass.

Laboratories.—The laboratories can be classified as follows: Dynamo, Communications and Transmission; Photometric, Measurements, Standards, High Tension, and Electronics. The Dynamo, High-Tension, and Electronics Laboratories are located in the wing; all the others are in the basement of Daniels Hall.

The Dynamo Laboratory.—This room is sixty by eight feet in area. Here the characteristics and operating conditions of representative types of machines are studied. This laboratory has a total of approximately 300 kva of motors and generators (about 50 in all). There are about 150 kilowatts available in motor-generator sets, and rotary converters.

There are also available approximately 150 kva of transformers for tests.

The laboratory is well supplied with accessory equipment, such as load units, field rheostats, starting boxes, prony brakes, inductances, capacitors, and other devices.

The Communications and Transmission Laboratory.—The Communications and Transmission laboratory is equipped for measurements and tests on communication and power-transmission circuits. It contains an outstanding artificial power-transmission line on which power-transmission line characteristics can be duplicated for study and testing. A complete long-line telephone system, with two two-way repeaters and associated apparatus, arranged for all usual and several special tests, is another feature of this laboratory. Other equipment for study and test includes an artificial line for the study of corona effects, artificial telephone lines, telephone central-station equipment, telegraph equipment, teletypewriter equipment, and a 100-line private automatic exchange with its associated appliances. Test equipment includes standard oscillators, transmission-measuring sets, noise-measuring sets, power-level instruments, audibility meters, alternators, and apparatus for measuring distortion.

Photometric Laboratory.—This laboratory is housed in a room especially fitted up for the purpose. The equipment includes photometric standard lamps, two 300-cm. Leeds & Northrup photometer bars, a 36" Ulbrecht spherical photometer, two Macbeth-Evans Illuminometers, several Weston foot-candle meters, and other portable photometers. There is also the usual list of accessories, such as sight boxes of the Lummer Brodhem, and flicker types, rotating disk, and screens.

Measurements Laboratory.—The Measurements Laboratory is arranged for making standard and special tests and measurements on the fundamental electrical units. The apparatus includes standards of resistance, inductance and capacitance, with special bridges for the measurement of each, Fahy permeameter and Epstein core-loss test sets for magnetic measurements on iron and steel, a special double-bridge and oil-bath arrangement for conductivity measurements, and other special test appliances.

The Standards Laboratory.—The Standards Laboratory is arranged to make all standardization tests. Its equipment includes standard cells, a Leeds-Northrup Type-K and a Queen-Gray Potentiometer, Standard ammeters, voltmeters, wattmeters, watthour meters (also a precision standard ammeter and wattmeter), standard instrument transformers, standard resistances, and two States watthour-meter test tables. Special equipment used includes a sine-wave generator, a constant-speed frequency set, Silsbee current and potential transformer tests sets, and others.

High-Tension Laboratory.—The High-Tension Laboratory has a 7½-kva 50,000-volt, and a 10-kva, 100,000-volt transformer. The induction regulators which go with these transformers make it possible to vary the voltage from zero to 150,000 volts. There is also a standard oil-testing cup for testing transformer oil, a standard spark gap, and numerous insulators of various types for carrying on routine tests. Frequent use is made of the cathode-ray oscillograph in studying surges and other disturbances.

The Electronics Laboratory.—The Electronics Laboratory is arranged for testing electronic devices and their associated equipment and circuits. It is supplied with the various types of electron tubes, including vacuum tubes, gaseous tubes, phototubes, mercury-vapor tubes, cathode-ray tubes, and apparatus for operating and testing them. The test equipment includes vacuum-tube bridge and test sets, oscilloscopes, and the various sensitive instruments required for electronics measurements. Television equipment is being provided through a recent gift to the Department.

Instrument Room and Shop.—A centrally located Instrument Room serves all of the laboratories. Instruments are issued upon requisition, and returned at the end of the laboratory period. They are kept in repair by a competent man who divides his time between the care of the instruments and the Departmental Shop, which adjoins the Instrument Room. The Shop is fitted up with sufficient tools for making all minor repairs to laboratory equipment as well as apparatus for special research.

Storage-Battery Room.—This room contains two 120-volt, 100-ampere-hour batteries; two 24-volt, 200-ampere-hour batteries, and the complete battery and counter emf cells for operating the automatic telephone station, and portable cells of various types, motor-generator sets, and mercury-vapor and tungar rectifiers, provided for charging the batteries.

Purposes of the Curriculum.—The training of young men for active work in a field as wide and diversified as the Electrical Industry demands, above all else, a thorough preparation in the sciences underlying all branches of engineering, a broad foundation in fundamental electrical theory, and a clear understanding of the characteristics of electrical machinery and systems. These factors are essential for success, whether it be in the design and manufacture of electrical equipment, in power production and utilization, or the fields of communication and signaling, as in all these branches of the industry technical advances are being made with increasing rapidity. With this object in view the curriculum in Electrical Engineering includes comprehensive training in mathematics, physics, and chemistry—the fundamental sciences—and adequate training in allied branches of engineering. All courses are accompanied by coördinated work in the laboratory and intensive drill in the applications of theory by means of carefully planned problems. In the senior year the student is offered two options, one in the fundamentals of communication, the other in the field of industrial applications.

The curriculum includes a thorough drill in the preparation of technical reports. There is a decided trend in industry to select for high administrative positions men who have had thorough technical training and have in addition developed executive ability. The electives included in the curriculum in Electrical Engineering enable a student inclined toward executive work to take non-professional courses which deal with the economic and sociological problems of the day. On the other hand, those students who prefer the more technical phases of engineering can select scientific electives specially helpful in that particular branch of the profession into which they wish to go. Students are urged to plan as early as possible a worthwhile group of elective courses so chosen as to round out their curriculum.

Each student is also required to spend at least six weeks in satisfactory industrial employment before receiving his degree, and during the senior year to make an inspection trip to a number of modern electric installations and submit a report upon these.

Close coördination in the work of the American Institute of Electrical Engineers is secured through a student branch at the College, which meets twice a month, through the State Section of the Institute, which meets several times during the year, and through the regional meetings of the Institute, one section of which is organized as a student-activities conference.

CURRICULUM IN ELECTRICAL ENGINEERING

Freshman Year

For the freshman year, refer to page 75.

Surveying, C.E. s200, 3 credits, is required in the summer immediately following the freshman year.

Sophomore Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Differential Calculus, Integral Calculus I and II, Math 201, 202, 203	4	4	4
Physics for Engineers, Phys. 201, 202, 203	4	4	4
*Business English, Public Speaking and English or American Literature, Eng. 211, 231, 261 or 221 or 337	3	3	3
General Economics, Econ. 201, 202, 203	3	3	3
Metal Work, M.E. 128	0	0	3
†Electrical Engineering Fundamentals, E.E. 201, 202	3	3	0
‡Military Science II, Mil. 201, 202, 203	2	2	2
Sport Activities, P.E. 201, 202, 203	1	1	1
	20	20	20

Junior Year

Engineering Mechanics, E.M. 311, 312, 313	3	3	3
Elementary Mechanism, M.E. 215, 216, 217	1	1	1
Engineering Thermodynamics, M.E. 307, 308, 309	3	3	3
Mechanical Engineering Laboratory II, M.E. 313, 314, 315	1	1	1
Technical Writing, Eng. 324	0	3	0
Differential Equations, Math. 301	3	0	0
Elementary Modern Physics, Phys. 307	0	0	3
Electrical Engineering, E.E. 301, 302, 303	3	3	3
Electrical Engineering Problems, E.E. 305, 306, 307	1	1	1
Electrical Engineering Laboratory, E.E. 311, 312, 313	2	2	2
Electives	3	3	3
	20	20	20

Summer requirement: six weeks industrial employment.

Senior Year

Business Law, Econ. 307	0	0	3
Accounting for Engineers, Econ. 212	0	3	0
Engineering Economics, I.E. 301	3	0	0
Strength of Materials, E.M. 320	3	0	0
Electrical Industry, I.E. 402	0	3	0
Fluid Mechanics, E.M. 331, 332	3	3	0
Illumination, E.E. 437	0	0	3
Electric Transmission, E.E. 403	0	0	4
Electric Distribution, E.E. 433	0	0	3
Alternating Current Machinery, E.E. 401, 402	4	4	0
Electrical Engineering Laboratory, E.E. 411, 412, 413	2	2	2
First Option			
Electric Communication, E.E. 425, 426, 427	3	3	3
Second Option			
Electric Power Application, E.E. 421, 422, 423	3	3	3
Electives	3	3	3
	21	21	21

All seniors will be required to go on the inspection trip as part of their curriculum.

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* Students who have been certified by the Department of English as proficient in English may substitute for the courses listed French, M.L. 101. Such students are expected to take two years of French.

† Sophomore class is divided into two sections, one half taking Fundamentals and Metal Shop as scheduled, the other half taking the Metal Shop during the Fall Term and the Electrical Engineering Fundamentals the second and third terms.

‡ Or 6 credits in one or two of the following departments: Economics, Psychology, History, Modern Language, Sociology.

GENERAL ENGINEERING

The Curriculum in Engineering Leading to the Bachelor of Science in Engineering

Today we live in a world of applied science, and for that reason the cultured gentleman of the twentieth century must know something of Engineering; otherwise, he is not well informed.

Engineering is not only a means of earning a livelihood; it is also a culture, a manner of thinking and living. It is founded upon the pure sciences of Mathematics, Physics, and Chemistry. It deals largely with Materials, Methods, Men, and Money. There appears to be an increasing demand for a curriculum which will offer to young men the opportunity to study Engineering as a field of culture, with no specific purpose of specialization but solely with the idea of securing a well balanced, thoroughly rigorous training and discipline in the basic principles of Engineering. Largely for this reason this curriculum is here offered for the first time. It is not an easy one; it omits no essential foundation stone in the present recognized engineering curricula. The freshman year is identical with that of all other Engineering curricula. The sophomore, junior, and senior years differ from the specialized curricula only in that specialized technical courses are omitted and to some extent replaced by electives which must be taken more largely in the social sciences.

The advantages of this curriculum are several:

The student acquires a better, broader training in the basic principles of all Engineering curricula.

He has more electives and more freedom in the choice of these electives than in the specialized curricula.

The total length of the curriculum is 9 term credits shorter than any of the specialized curricula. This permits a student more time for extracurricular activities which are an essential part of the lives of all college students, yet because of the heavily loaded condition of the specialized curricula are frequently crowded out for all but the very best and most energetic students.

This curriculum will be administered the first two years by B. F. Brown the Dean of the Basic Division, the last two years by B. R. Van Leer the Dean of the School of Engineering.

The curriculum leads to the B.S. in Engineering and is as follows:

GENERAL CURRICULUM IN SCHOOL OF ENGINEERING

Freshman Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Same as now required for all Engineering students ..... See page 75.	19	19	19

Sophomore Year

Differential and Integral Calculus, Math. 201, 202, 203	4	4	4
Physics, Phys. 115, 116, 117	5	5	5
English or Modern Language[1]	3	3	3
Military Science II, Mil. 201, 202, 203 or Elective	2	2	2
Fundamental Activities, P.E. 201, 202, 203	1	1	1
Elective[2]	4	4	4
	19	19	19
Summer School Surveying, C.E. 102s	3		

Junior Year[3]

Engr. Mechanics, E.M. 211, 212, 213	3	3	3
Strength of Materials, E.M. 221, 222	0	3	3
Engr. Geology, Geol. 201	3	0	0
Thermodynamics and Lab., M.E. 207, 208, 209	3	3	3
and M.E. 213, 214, 215	1	1	1
Economics, Econ. 103, or other Social Science	3	3	3
Elective[2]	6	6	6
	19	19	19

Senior Year

Elements of Elect. Eng., E.E. 230	4	4	4
Elements of Structures, C.E. 313	0	3	3
Fluid Mechanics, E.M. 230	3	0	0
Business Law, Econ. 211	3	0	0
Chem. of Eng. Materials, Chem. E. 212, 213	0	3	3
Accounting I, Econ. 201	3	3	3
Elective[2]	6	6	6
	19	19	19

[1] Students who do not make an average grade of B or better in Freshman English will be required to continue English in the Sophomore year.

[2] Free electives, except that not more than 15 term credits may be chosen from the technical or special technical courses in the School of Engineering.

[3] Students who contemplate the addition of a fifth year in Engineering for the purpose of obtaining a professional degree will consult the head of the department in which he intends to major and make such substitutions for the Engineering courses offered in this curriculum as are necessary for the satisfactory completion of the technical requirements of the degree sought.

GEOLOGICAL ENGINEERING

Professor: JASPER L. STUCKEY, Ph.D., *Head of the Department*
Instructor: JOHN M. PARKER, III, Ph.D.
Teaching Fellow: D'ARCY R. GEORGE, B.S.

Facilities.—The function of the Department of Geology is twofold: first, to offer service courses required as prerequisites in the Agriculture, Education, and Engineering curricula; second, to administer the curriculum in Geological Engineering.

The classrooms, laboratories, and offices of the Department are in Primrose Hall. The equipment includes a varied collection of minerals, rocks, and fossils, illustrating the materials of different parts of the earth's crust; laboratory equipment for carrying on qualitative chemical and blowpipe examination of minerals and rocks; microscopes and other optical equipment; facilities for making thin sections of rocks and minerals; geological models; a collection of topographic maps and geologic folios illustrating important and typical areas in the United States.

Curriculum.—This curriculum is designed to train young men in the fundamentals of engineering with its special application to geology. Many engineering undertakings, especially major construction projects, such as large dams and reservoirs, tunnels, and large buildings, depend for success on exact knowledge of their geological setting. On the other hand, such geological problems as the economical development of mineral resources require the use of the precise methods of enginering. The curriculum combines these two sorts of information and training so necessary to success in this important specialized field.

Well-trained geological engineers are in demand by mining and oil companies, by State and Federal Geological Surveys, in the larger industries using mineral raw materials, by leading railways, by hydro-power concerns, and as teachers of geology in technical schools. Openings in this field have been on the increase because of the recent recognition that the geological aspects of engineering and industry have been nglected. Consequently, men with the specialized training required have been difficult to find.

The mineral resources of the State offer important possibilities for large future developments. In Western North Carolina there exist valuable deposits of copper, nickel, iron, feldspar, mica, kaolin, cyanite, barite, granite, limestone, and other minerals; in Central North Carolina are coal deposits of promising quantity and quality, and large areas of pyrophyllite, granite and other building stone; and on the Coastal Plain are deposits of phosphate and marls. The production and use of these materials will undoubtedly be expanded as their availability becomes better known. Their profitable development will require more and more skill in geology and engineering, not merely in the extraction of the ore, but more especially in controlling the direction of the work.

New discoveries are sure to be made in such a richly mineralized area, but no longer by chance or superficial hunting. The day of the old-time, untrained prospector is gone; every resource of science must now be utilized in this increasingly difficult search. The successful prospector of the future must understand the physical and chemical processes and conditions responsible for each kind of mineral deposit, as well as the secondary alterations they may undergo. He must be capable of using the complex and sensitive instruments devised for investigating the earth's crust far below the surface.

In these related fields of major engineering projects and the economical extraction of the mineral raw materials of industry, men well trained in the fundamentals of the physical sciences and in engineering technology will occupy key positions. In a civilization such as ours this must be an increasingly large field.

CURRICULUM IN GEOLOGICAL ENGINEERING

Freshman Year

For the freshman year, refer to page 75.

Sophomore Year

COURSES	CREDITS First Term	Second Term	Third Term
Differential Calculus, Integral Calculus I and II, Math. 201, 202, 203	4	4	4
*Business English, Public Speaking and English or American Literature, Eng. 211, 231, or any one of 261-267	3	3	3
Qualitative Analysis, Chem. 211	4	0	0
Quantitative Analysis, Chem. 212, 213	0	4	4
Physics for Engineers, Phys. 201-2-3	4	4	4
Engineering Geology, Geol. 220	3	0	0
Historical Geology, Geol. 222	0	3	0
Mineralogy, Geol. 230	0	0	3
†Military Science II, Mil. 201, 202, 203	2	2	2
Sport Activities, P.E. 201, 202, 203	1	1	1
	21	21	21

Junior Year

Engineering Mechanics, E.M. 301,302	0	3	3
Theoretical Surveying, C.E. 221-2	3	3	0
Field Surveying, C.E. 225	1	0	0
Mapping, C.E. 226	0	1	0
Heat Engineering III, M.E. 303	0	0	3
Physical Chemistry, Chem. 231	5	0	0
General Economics, Econ. 201-2-3	3	3	3
Geology and Mineral Resources of North Carolina, Geol 325	3	0	0
Petrology, Geol 441	3	0	0
Advanced Mineralogy, Geol. 332	0	3	0
Structural Geology, Geol. 352	0	3	0
Physiography, Geol. 303	0	0	3
Ceramic and Mining Processes, Cer.E. 103	0	0	3
Electives	3	3	3
	21	19	18

Senior Year

Elements of Electrical Engineering I, E.E. 321-322	3	3	0
Fluid Mechanics, E.M. 330	0	0	3
Social Science Options	3	3	0
Business Law, Econ. 307	0	0	3
Technical Writing I, Eng. 324	3	0	0
Optical Mineralogy, Geol 431-32-33	3	3	3
Mining Engineering, Geol. 471-72-73	3	3	3
Advanced Engineering Geology, Geol. 461	3	0	0
Stratigraphy and Index Fossils, Geol 462	0	3	0
Field Methods, Geol. 463	0	0	3
Economic Geology, Geol. 412, 413	0	3	3
Electives	3	3	3
	21	21	21

All seniors will be required to go on the inspection trip as part of their curriculum.

* Students who have been certified by the Department of English as proficient in English may substitute for the courses listed French, M.L. 101. These students are required to take two years of French.

† Or 6 credits in one or two of the following departments: Economics, Psychology, History, Modern Language, Sociology.

‡ These options may be selected from courses in Economics, Education, History, Psychology or Sociology.

INDUSTRIAL ENGINEERING

Professor: H. B. Shaw, *Head of the Department*

North Carolina has an abundance of natural resources and its industries are progressing steadily, which facts together mean that there are increasing demands for educated personnel and informed leaders to deal with the complexities of modern industries.

Engineers have had a surprisingly large share in America's amazing industrial progress through their engineering knowledge and the adaptation of engineering methods and approach to the solution of industrial problems. To be even more effective in industry and modern life, engineers should, to their study of engineering, add knowledge of the economic and social sciences, because they have to deal not only with the materials and forces of nature but also with men, money, and affairs, and particularly with industrial relations.

The aim of the curriculum in Industrial Engineering is to prepare students to enter the employ of industries as engineering graduates, and, through experience, to develop into positions of responsibility and service; and thus to meet the demands of industries for men educated as engineers with special preparation for the activities of industries.

The curriculum provides thorough education in the subjects fundamental to engineering—basic engineering courses, courses in Psychology, Economics, and Accounting—and, besides, Industrial Engineering courses which apply engineering methods and principles to the study of industries; so that students may learn to make engineering, economic, and social analyses concurrently, and to apply them to the conduct of enterprises.

Electives, to be selected from engineering and other College courses, with the approval of the adviser, offer opportunity for the development of individual aptitudes.

Students in Industrial Engineering get class and laboratory instruction from other engineering departments and from other college courses and these are correlated and extended by the Industrial Engineering courses.

At present the classrooms and offices are in the Civil Engineering Building but larger quarters are to be provided and the instructional force increased in the near future.

CURRICULUM IN INDUSTRIAL ENGINEERING

Freshman Year

For the freshman year, refer to page 75.

Sophomore Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Differential and Integral Calculus I and II, Math 201, 202, 203	4	4	4
*Business English, Public Speaking, and English or American Literature, Eng. 211, 231 and any one of courses 261 to 267	3	3	3
Physics for Engineers, Phys. 201, 202, 203	4	4	4
General Economics, Econ. 201, 202, 203	3	3	3
Shopwork, M.E. 124, 125, 126	2	2	2
Industrial Organization, I.E. 101, 102, 103	3	3	3
†Military Science II, Mil. 201, 202, 203	2	2	2
Sport Activities, P.E. 201, 202, 203	1	1	1
	22	22	22

Junior Year

Engineering Mechanics, E.M. 301, 302	3	3	0
Strength of Materials, E.M. 320	0	0	3
Engineering Thermodynamics, M.E. 307, 308, 309	3	3	3
Mechanical Engineering Laboratory II, M.E. 313, 314, 315	1	1	1
Machine Shop III, M.E. 231, 232, 233	2	2	2
Accounting I, Econ. 301, 302, 303	3	3	3
Management Engineering, I.E. 201, 202, 203	3	3	3
Electives	6	6	6
	21	21	21

Summer requirement: six weeks industrial employment.

Senior Year

Technical Writing I, Eng. 321	0	3	0
Business Law, Econ. 307	3	0	0
Industrial Psychology, Psychol. 238	0	0	3
Materials of Construction, C.E. 321	3	0	0
Elements of Electrical Engineering II, E.E. 331, 332, 333	4	4	4
Engineering Economics, I.E. 301	3	0	0
Electrical Industry, I.E. 402	0	3	0
Industrial Engineering Problems, I.E. 312, 313	0	3	3
Investigation and Report, I.E. 443	0	0	3
Electives	6	6	3
	19	19	16

All seniors will be required to go on the inspection trip as part of their curriculum.

* Students who have been certified by the Department of English as proficient in English may substitute for the courses listed, French, M.L. 101. These students are required to take two years of French.

† Or 6 credits in one or two of the following departments: Economics, Psychology, History, Modern Language, Sociology.

MECHANICAL ENGINEERING

Professors: L. L. Vaughan, B.E., M.E., *Head of the Department*
E. G. Hoefer, B.S. in M.E., M.E.
H. B. Briggs, B.E., M.E.
F. B. Wheeler, B.E., M.E.
R. B. Rice, B.S. in M.E., M.E., A.M.
Associate Professors: H. E. Satterfield, B.S. in M.E., M.E.
F. F. Groseclose, B.S. in M.E., M.S. in M.E.
Assistant Professors: W. S. Bridges, B.E., M.S. in M.E.
G. G. Fornes, B.S. in M.E., M.S. in M.E.
L. R. Parkinson, B.S. in M.E., M.E.
Instructors: M. R. Rowland, B.S. in Ind. Arts
W. E. Selkinghaus, B.S. in M.E.
C. N. Sanford, B.S. in M.E.
R. J. Maddison, B.S. in M.E.
P. E. Moose, B.S. in C.E., M.S. in C.E.
T. C. Brown, B.S. in M.E., M.E.
T. L. Nash, B.S.
R. L. Cope, B.S. in M.E., M.Ed.
W. E. Adams, B.S. in Ed.
Instructor Emeritus: C. B. Park

Buildings and Equipment.—The Department of Mechanical Engineering occupies both Page Hall and the Shops Building. In Page Hall are the office of the Head of the Department, offices for the drawing division and the laboratory division, classrooms, drafting rooms, the Internal-Combustion-Engine Laboratory, Hydraulics Laboratory, and Aeronautical Laboratory. The Shops Building contains Foundry, Wood Shop, Forge Shop, and Machine Shop, and provides space for the Mechanical Engineering Laboratories. It contains also the offices of the instructors in the several shops and one classroom.

Drafting Rooms.—The drafting rooms are equipped with tables, stools, cases for boards, reference files, and models. The drafting rooms have two Universal Drafting Machines in addition to other necessary equipment. The blueprint room contains an electric blueprint machine and a sheet washer, besides the usual sun frames.

Shops.—The Wood Shop is equipped with a variety of modern machines: lathes, combination saw, dado saw, cut-off saw, jointer, mortisers, sanders, moulder, sticker, trimmer, shaper, boring machine, band saw, jig saw, various types of clamps, a glue room with electrical glue heater, and other essentials that go to make an up-to-date shop. The machines are motor driven with either individual or group drive. Work benches, hand tools and auxiliary equipment which are necessary.

The Foundry Equipment consists of a 36" cupola, a 14" cupola, brass furnace, core oven, core machine, moulding machines, cleaning mill, motor-

driven elevator, emery wheel and buffer, and the necessary tools and patterns for practical molding.

The Forge Shop is equipped with thirty anvils and forges, the blast for the forges being produced by a large power blower and regulated by an individual control on each forge easily accessible to the operator. The shop is also equipped with a modern down-draft-type exhaust system, thereby eliminating all overhead pipes which would interfere with the proper and efficient lighting of the shop. Other equipment consists of a special gas furnace for the heat treatment of steel, drill press, iron shears, vises, emery wheel and other necessary forging equipment. Modern equipment for both oxy-acetylene and electric welding is available.

The Machine Shop, well heated, lighted, and ventilated, is equipped with work benches, machinist's vises, and a variety of machine tools: engine lathes, bench lathes, shapers, planers, milling machines, vertical and horizontal boring mills, drill presses, slotting machines, grinders, arbor presses, and a variety of hand tools, cutters, clamps, jigs, and other equipment necessary to modern machine-shop practice. Some of the machines are group driven, others are individually driven.

Laboratories.—The Mechanical Engineering Laboratories, located in the Shops Building, are equipped with instruments and apparatus for making coal and gas analyses, oil tests, calibration tests, heat-transfer tests, and general-efficiency and thermodynamic tests. The steam-engine section of this laboratory includes plain slide-valve, automatic cut-off, multiple-expansion, and uniflow engines. It is equipped with a turbogenerator set complete with a high-vacuum condenser. A two-stage air compressor driven by a uniflow engine supplies air for experimentation. The heating and ventilation division contains several heating boilers with appropriate oil-burning equipment, each unit being complete for test. This laboratory is also equipped with an air conditioner, unit heaters, radiator-testing equipment, a half-ton refrigeration machine, insulation-testing equipment, and a fan-and-duct testing unit.

The Metallurgical Laboratory is equipped for work dealing with the structure and physical properties of metals and alloys. The equipment includes electric heat-treating furnaces with controls, indicating and recording pyrometers, apparatus for polishing and etching specimens, metallurgical microscopes with complete lens combinations and dark rooms for photographic and photoelastic equipment. The laboratory is also equipped with 15,000-lb. and 50,000-lb. material-testing machines.

The Aeronautical Laboratory, located in the basement of Page Hall, is equipped with a thirty-two-inch vertical-return wind tunnel, using the system of balances of the National Advisory Committee on Aeronautics. The arrangement of the tunnel is such that the National Physics Laboratory system may be used with wind velocities up to sixty miles per hour. A complete set of flight instruments is available for study, experiments, and

tests. The laboratory houses, in addition to the major components of many well-known airplanes, a complete airworthy biplane.

The Internal-Combustion-Engine Laboratory, also located in the basement of Page Hall, contains high-speed and low-speed compression-ignition engines, automotive and stationary spark-ignition engines, air-cooled and water-cooled aircraft engines, together with dynamometers, water brakes, and instruments for testing.

The Hydraulic Testing Laboratory, in Page Hall, contains a ten-inch Francis-Type Hydraulic Turbine attached to an electric dynamometer with weirs, flumes, and instruments for complete test. The laboratory has high-speed and low-speed centrifugal pumps arranged for tests, together with venturi tubes, weirs, meters, nozzles, and a hydraulic channel for the study of flow.

The laboratories are designed around the unit system for instruction whereby units or whole divisions of the laboratory may be operated without depending on or interfering with other divisions.

Purposes.—The Mechanical Engineer is primarily a designer and builder of machines and other equipment for use in manufacturing processes, transportation, and the generation of power. He is responsible for the conservation and economical use of the power-producing resources of the world through the application of the proper kind of equipment in each field of production. He is called upon to take charge of the executive management of the manufacturing, transportation, and power industries. For the Mechanical Engineer to be well grounded in his profession, he must be thoroughly familiar with both the science and the art of engineering.

The curriculum in Mechanical Engineering begins with a thorough training in Mathematics, Physics, and Chemistry as a foundation for the technical work which is later developed along several parallel lines. The student is taught how these fundamental sciences are applied to the physical properties of the materials of construction, and to the transformation of heat energy into work and power. This is accomplished by means of courses in Drafting, Metallurgy, Mechanics, and Thermodynamics; by the work in the wood shop, forge shop, foundry, and machine shop, and by the tests performed in the mechanical laboratory.

An option is offered in the Mechanical Engineering curriculum for students who desire special training in furniture design and construction. It is the purpose of the option to prepare the students for administrative and executive positions in the furniture industry. The option includes the fundamental laws of design through the study of good examples and through practice in construction. It also includes a study of the characteristics of furniture of the different periods, which enables the student to identify an article by its style, and to name and understand its different points in style. The furniture used in the dormitories and the special equipment for the laboratories and offices are manufactured in the woodworking department. This work gives a student valuable experience in actual production.

CURRICULUM IN MECHANICAL ENGINEERING I—GENERAL

Freshman Year

For the freshman year, refer to page 75.

Sophomore Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Differential Calculus, Integral Calculus I and II, Math. 201, 202, 203	4	4	4
*Business English, Public Speaking, Eng. 211, 231	3	3	0
Physics for Engineers, Phys. 201-2-3	4	4	4
Mechanical Drawing, M.E. 211-12-13	2	2	2
Metallurgy, M.E. 221-222-223	2	2	2
Shopwork, M.E. 124, 125, 126	2	2	2
Engineering Mechanics, E.M. 311	0	0	3
†Military Science, Mil. 201, 202, 203	2	2	2
Physical Education, P.E. 201-2-3	1	1	1
	20	20	20

Surveying, C.E. s200, Summer Camp—3 credits.

Junior Year

Engineering Mechanic, E.M. 312, 313	3	3	0
Machine Shop II, M.E. 227, 228, 229	1	1	1
Engineering Thermodynamics, M.E. 307-8-9	3	3	3
Mechanical Engineering Laboratory II, M.E. 313, 314, 315	1	1	1
‡Kinematics, M.E. 317-318-319	3	3	3
Materials of Construction, C.E. 321	3	0	0
Strength of Materials, E.M. 321, 322	0	3	3
English or American Literature, Eng. 261, or 265, 266, 267	3	0	0
Fluid Mechanics, E.M. 331, 332	0	3	3
Technical Writing, Eng. 321	0	0	3
Electives	3	3	3
	20	20	20

Summer requirement: six weeks industrial employment.

Senior Year

General Economics, Econ. 201, 202, 203	3	3	3
Power Plants, M.E. 401, 402, 403	3	3	3
Heating and Air Conditioning, M.E. 404	0	3	0
‡Machine Design, M.E. 411, 412, 413	3	3	3
§Refrigeration, M.E. 405	0	0	3
Mechanical Engineering Laboratory III, M.E. 407, 408, 409	1	1	1
Elements of Electrical Engineering II, E.E. 331, 332, 333	4	4	4
Business Law, Econ. 307	3	0	0
Electives	3	3	3
	20	20	20

All seniors will be required to go on the inspection trip as part of their curriculum.

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* Students who have been certified by the Department of English as proficient in English may substitute for the courses listed French, M.L. 101. Such students are required to take two years of French.

† Or 6 credits in one or two of the following departments: Economics, Psychology, History, Modern Language, Sociology.

‡ Furniture Option, M.E. 237, 238, 239, or Aero. Option, M.E. 323, third term.

§ Furniture Option, M.E. 341, 342, 343.

MECHANICAL ENGINEERING II—AERONAUTICAL OPTION

The continual development in Aeronautics is constantly producing a demand for men with aeronautical training. To meet this demand, the Mechanical Engineering Department is offering an option in Aeronautics. This course is designed to train engineers for the design and practice in this field.

The curriculum of the option is essentially the General Mechanical Engineering Curriculum, the two being almost identical for the first three years. In the fourth year, however, special emphasis is placed upon the studies pertaining to aircraft engines, and the design and aerodynamics of airplanes. In addition to theoretical instruction, practical experiments and tests are made in the laboratories.

A large and well-equipped airport near the campus adds interest and offers an opportunity for practical instruction. In view of the fact that Raleigh is situated on a North-South airplane course, the student has a wonderful opportunity to inspect the various types of airplanes that make calls at the local airport.

AERONAUTICAL OPTION

Freshman and sophomore years identical with Mechanical Engineering.

Junior Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Engineering Mechanics, E.M. 312, 313	3	3	0
Machine Shop II, M.E. 227, 228, 229	1	1	1
Engineering Thermodynamics, M.E. 307, 308, 309	3	3	3
Mechanical Engineering Laboratory II, M.E. 313, 314, 315	1	1	1
Kinematics, M.E. 317, 318	3	3	0
Introduction to Aeronautics, M.E. 323	0	0	3
Materials of Construction, C.E. 321	3	0	0
Strength of Materials, E.M. 321, 322	0	3	3
Fluid Mechanics, E.M. 330	0	0	3
Business Law, Econ. 307	0	3	0
Technical Writing I, Eng. 321	0	0	3
English or American Literature, Eng. 261 or 265, 266, 267	3	0	0
Electives	3	3	3
	20	20	20

Summer requirement: six weeks industrial employment or ten hours solo flying.

Senior Year

General Economics, Econ. 201, 202, 203	3	3	3
Aircraft Engines, M.E. 421, 422, 423	3	3	3
Airplane Design, M.E. 425, 426, 427	3	3	3
Aerodynamics, M.E. 417, 418, 419	3	3	3
Aeronautical Laboratory, M.E. 431, 432, 433	1	1	1
Elements of Electrical Engineering II, E.E. 331, 332, 333	4	4	4
Electives	3	3	3
	20	20	20

All seniors will be required to go on the inspection trip as part of their curriculum.

THE ENGINEERING EXPERIMENT STATION

PROFESSOR HARRY TUCKER, B.A., B.S., C.E., *Director*
Room 207, Civil Engineering Building, State College Station, Raleigh, N. C.

Establishment.—The Engineering Experiment Station of State College was established in 1923, as provided by the General Assembly of that year. It is an integral part of the School of Engineering, and is engaged in an organized program of research consisting of individual projects carefully defined and approved, which are carried on by engineering teachers. The Station fits uniquely into the program of instruction, research, and extension of State College.

Purpose.—The efforts of the Engineering Experiment Station are directed along the following lines:

(a) The investigation of resources and processes, through experimentation and tests, with the object of opening and developing wider fields for the use of the natural resources of the State.

(b) Coöperation with industrial organizations in the solution of technical problems, which require such facilities and equipment as are available at State College.

(c) The coördination of research undertaken by the Engineering School.

(d) The publication of the results of experimental and research projects made by the Engineering Experiment Station and the several Engineering Departments of State College.

Publications.—The Experiment Station has, since its organization, coöperated with various organizations and industries in the State in the investigation of problems peculiar to North Carolina. The results of such investigations have, from time to time, been issued in the form of Bulletins. The following is at present a complete list of the publications of the Station.

Bulletin No. 1. "County Roads: Organization, Construction and Maintenance" by Harry Tucker, James Fontaine, and L. D. Bell.

Bulletin No. 2. "Tests of Face and Common Brick Manufactured in North Carolina" by A. F. Greaves-Walker and James Fontaine.

Bulletin No. 3. "Poles from North Carolina Forests" by Wm. Hand Browne, Jr., and James Fontaine.

Bulletin No. 4. "Motor Vehicle Accidents in North Carolina" by Harry Tucker.

Bulletin No. 5. "Occurrence and Physical Properties of North Carolina Marble" by Jasper L. Stuckey and James Fontaine. Price twenty cents.

Bulletin No. 6. "The Occurrence, Properties, and Uses of the Commercial Clays and Shales of North Carolina" by A. F. Greaves-Walker, N. H. Stolte, and W. L. Fabianic. Price fifty cents.

Bulletin No. 7. "Highway Grades and Motor Vehicle Costs" by Howard Burton Shaw and James Fontaine. Price twenty cents.

Bulletin No. 8. "Financial Management for Highways" by Marc C. Leager. Price one dollar.

Bulletin No. 9. "Highway Accidents in North Carolina and Guides to Safety" by Harry Tucker. Price fifty cents.

Bulletin No. 10. "North Carolina Building Code" by the North Carolina Building Code Council. Price one dollar.

Bulletin No. 11. "The Production of an Insulating Brick Using North Carolina Shales" by A. F. Greaves-Walker, W. C. Cole, Jr., and S. C. Davis. Price twenty cents.

Bulletin No. 12. "The Development of Pyrophyllite Refractories and Refractory Cements" by A. F. Greaves-Walker, C. W. Owens, Jr., T. L. Hurst, R. L. Stone. Price fifty cents.

Bulletin No. 13. "The Preparation of Concrete Using North Carolina Materials" by Harry Tucker and W. G. Geile.

Bulletin No. 14. "The Location and Distribution of the Ceramic Mineral Deposits of North Carolina" by A. F. Greaves-Walker and S. G. Riggs, Jr. Price twenty-five cents.

Bulletin No. 15. "A Study of Courses in Technical Writing" by A. M. Fountain. Price one dollar.

Bulletin No. 16. "The Production of Unfired and Fired Forsterite Refractories from North Carolina Dunites" by A. F. Greaves-Walker and R. L. Stone. Price fifty cents.

Current Activities.—The Experiment Station is now assisting in the following investigations that are being conducted by the several Departments of the Engineering School:

1. The development of an unfired aluminous refractory from pyrophyllite.

2. In coöperation with the North Carolina State Highway and Public Works Commission: The load distribution on highway bridge floors.

3. In coöperation with the Rural Electrification Administration: Permissible motor loads on rural lines.

4. The geology of Wake County, North Carolina, with particular reference to the extent and value of the soapstone deposits.

5. Drafting-room practices in North Carolina, with the objective of standardizing the preparation of drawings.

6. In coöperation with the Department of Chemistry of the College: The relation of Vitamin A to night blindness.

THE TEXTILE SCHOOL

THOMAS NELSON, *Dean and Director of Textile Research*

Organization.—The Textile School of North Carolina State College is organized for the purposes of administration into four departments: Yarn Manufacturing and Knitting, Weaving and Designing, Textile Chemistry and Dyeing, Textile Research.

The Textile School is organized to offer technical instruction, both graduate and undergraduate, in the production and finishing of textile products. It is also organized and equipped to conduct fundamental textile research and coöperates with the School of Agriculture and the United States Department of Agriculture in efforts to improve and develop new uses for the cotton fiber.

Purpose.—The purpose of the Textile School is to educate men for professional service in Textile Manufacturing, Textile Management, Textile Chemistry and Dyeing, Yarn Manufacturing, Knitting, and in Weaving and Designing; to develop their capacities for intelligent leadership; to equip them to participate in commercial and public affairs; to aid in the development of the textile industry and its commerce through research and experimentation; to coöperate with the textile mills of the State in gaining, through scientific research, information that will improve the quality and value of manufactured products and increase technical skill.

Occupations.—Never before in America have more opportunities been offered to young men of North Carolina and the South than are available today to graduates of the Textile School.

North Carolina is the largest textile manufacturing State in the South and has more mills than any other State in America. It has the largest towel, damask, denim, and underwear mills in America; and it has more mills that dye and finish their own products than any other Southern State. A great diversification of manufactured textile products is being made in cotton, rayon, silk, wool, and worsted.

The courses of instruction are arranged and grouped so that students may get the best results from their work, and accumulate the necessary knowledge, which together with actual experience after graduation, enables them to fill such positions as the following:

Owners of mills
Presidents and vice presidents of mills and other textile establishments
Secretaries and treasurers of mills
Managers, superintendents, and department foremen in cotton, rayon, silk, and hosiery mills
Superintendents and foremen in mercerizing, bleaching, dyeing, and finishing plants
Designers and analysts of fabrics
Technical demonstrators in the dyestuff industry
Textile chemists

Textile cost accountants in mills
Purchasing agents for mills
Salesmen of machinery, yarn, cloth, rayon, dyestuffs, and chemicals.
Positions in yarn and fabric commission houses and with fabric converters
Specialists in Government service
Representatives for manufacturers of machinery, rayon, dyestuffs, and mill supplies.

Degrees.—Upon the completion of any one of the curricula in Textiles the degree of Bachelor of Science in Textiles is conferred.

The degree of Master of Science in Textiles is offered for the satisfactory completion of one year of graduate study in residence. Candidates for the degree of Master of Science in Textiles enter and are enrolled in the Graduate Department of the College.

The professional degree of Master of Textiles may be conferred upon graduates of the Textile School after five years of professional practice in charge of important work and upon the acceptance of a satisfactory thesis.

Requirements.—The requirements for graduation in the Textile School are the satisfactory completion of all the courses in one of the prescribed curricula (see tabulations of curricula on the pages following), a total of not less than 230 term credits, with not fewer than 230 honor points.

Of the minimum of 230 term credits required for graduation in the Textile School, 153 are common to all curricula; that is, 12 term credits in Mathematics, 18 in Language, 36 in Economics and Psychology, 12 in Chemistry, 15 in Physics, 12 in Engineering, 6 in Agriculture, 24 in General Textile, 12 in Military Training or Social Science alternatives, and 6 in Physical Education. Each of the curricula permits election of 18 term credits.

Inspection Trip.—Each student is required to make an inspection trip during his senior year to mills making various classes of fabrics, also to bleaching, dyeing, finishing, and hosiery plants. The trips are made in chartered busses.

Curricula.—The freshman and sophomore work is the same for all students in the Textile School. The training is general, and gives the student a good opportunity to make a wise choice in the selection of the particular field in which he desires to specialize. Five curricula are offered:

1. Textile Manufacturing
2. Textile Management
3. Textile Chemistry and Dyeing
4. Weaving and Designing
5. Yarn Manufacturing

Textile Manufacturing and Textile Management offer work in all Departments of the Textile School; these are therefore general curricula with one placing more emphasis on manufacturing, the other, more emphasis on economics.

Students who select Textile Chemistry and Dyeing, Weaving and Design-

ing, or Yarn Manufacturing devote a larger percentage of their time to specialization in one Department of the Textile School.

Textile Curricula for University and College Graduates.—Selected courses leading to the degree Bachelor of Science in Textiles are offered to graduates of universities and standard colleges. These are arranged in accordance with the vocational aim of the individual student and in the light of credits presented from the institution from which the student has been graduated, subject to the approval of his adviser and the director of instruction. In cases where the student presents enough credits which may be used for courses required in his curriculum, he may be graduated B.S. in Textiles within one year. In no case should it take more than two years to complete the work for the degree.

Short Course for Textile Mill Men.—Instruction in yarn manufacturing, weaving, designing, fabric analysis and dyeing, lasting two weeks in the second term, is offered for textile mill men who wish to make a short and intensive study of any of these subjects. The subject matter will be selected to suit the requirements of each individual.

Yarn Manufacturing and Knitting

Professor: J. T. HILTON, *Head of Department.*
Assistant Professor: J. G. LEWIS.
Instructor: G. R. CULBERSON

Purpose.—The purpose of this department is to instruct students in the theory and practice of producing yarns and hosiery; to coöperate with mills in solving manufacturing problems through research and experimentation; and to manufacture the yarns used in the weave room. This Department is located on the top floor of the Textile Building.

Opening and Picking.—The opening and picking equipment is placed in a separate room and consists of bale breaker, vertical opener, C.O.B. and condenser, breaker picker, and finisher lapper.

Carding and Spinning.—This equipment occupies two rooms. The larger one is used for instruction. The machinery consists of cards, regular and controlled-draft drawing frames, fly frames, spinning frames, warper, spooler, winders, regular and fancy twisters, and a complete unit of combing machinery for the production of fine yarns. The smaller room contains a complete unit of carding and spinning machinery, including several types of long-draft spinning; it is used as an experimental laboratory. Thus student instruction and experimental work do not conflict. Both rooms are equipped with Parks-Cramer humidifiers.

Knitting.—This department is equipped with a variety of circular knitting machines for making children's hose, ladies' hose, and men's plain and fancy half-hose. It is also equipped with a Wildman single head, single unit full fashioned hosiery machine, Merrow sewing machine, loopers, bottle bobbin winder, Universal winder, balances, etc.

Research Laboratory.—This laboratory contains a single strand tester,

Mullen tester, yarn and cloth testing machines with autographic recorder, twist counter, crimp tester, conditioning oven, and other necessary apparatus to test cotton and rayon yarns and fabrics for moisture content, twist and tensile strength.

Weaving and Designing

Professor: T. R. HART, *Head of Department.*
Associate Professor: W. E. SHINN.
Instructor: G. B. PEELER.

Purpose.—The purpose of this department is to instruct students in the theory and practice of weaving and designing fabrics ranging from simple print cloths to elaborate leno and jacquard creations, to coöperate with the home economics departments of North Carolina colleges in creating consumer interest in textile products, to coöperate with mills in solving manufacturing problems through research and experimentation. This department is located on the ground floor of the Textile Building.

Weave Room.—This room contains a larger variety of looms than can be found in any textile mill. These have been carefully selected so that the students may obtain a knowledge of the different cotton, rayon, and silk looms made in the United States. It also contains looms to produce such fabrics as print cloths, sheetings, denims and twill fabrics, ginghams, fancy shirtings, dress goods, and plush, as well as fancy leno and jacquard fabrics. The weave room has been modernized so that the students can be trained in the technique of manufacturing fancy cotton, rayon, and combination fabrics on automatic, dobby and jacquard looms. Other equipment in the weave room includes Universal filling winders, braiders and Bahnson humidifiers.

Warp Preparation.—Short warps in the Textile School are made on the silk and rayon equipment in this department which consists of a silk and rayon skein winder and a combination warper and beamer. Other equipment includes a slasher and cotton beaming frame.

Designing and Fabric Analysis.—A full equipment of design boards for single and double cloths is provided in the classrooms. Dies for cutting samples and different makes of balances and microscopes are provided for the analysis of fabrics. Other designing equipment includes an enlarging camera, card cutting pianos and card lacing equipment.

The curriculum in Weaving and Designing is listed with the other Textile curricula.

Textile Chemistry and Dyeing

Professor: A. H. GRIMSHAW, *Head of Department.*
Instructor: A. C. HAYES.

Purpose.—The purpose of this department is to instruct students in the theory and practice of dyeing, printing and finishing yarns and fabrics; to conduct experiments; to coöperate with the mills of the State in solving problems relating to the dyeing and finishing of textile products; to dye the yarns used in the weave room to produce fabrics. This department is located on the basement floor of the building.

Equipment.—The Dye Laboratory is fitted up with work tables, balances, steam baths, drying oven, and other apparatus for experimental dyeing, dye testing, color matching, and the testing of dyed samples by acids and alkalies. It also contains roller, spray and screen printing apparatus.

The Dye House is equipped with kier; raw stock, package, skein and hosiery dyeing machines; a cloth dyeing machine of the creel type; hydro-extractor; raw stock dryer and other equipment needed in the dyeing of larger quantities of material and in giving instruction in boiling out, bleaching and dyeing raw stock, skeins, warps, hosiery, and piece goods.

Research Laboratory contains microscopes, photo-micrographic cameras and projector, fadeometer, pH apparatus, viscosimeters, extractors, separator, analytical balances, electric oven, equipment for testing oil and finishing compounds, as well as the analytical equipment generally used by textile chemists. It also contains a dark room fully equipped for photographic work.

The curriculum in Textile Chemistry and Dyeing is listed with the other Textile curricula.

Textile Research

THOMAS NELSON, *Director*

For a number of years the Division of Cotton Marketing, United States Department of Agriculture, has stationed a representative at the Textile School to coöperate in producing new uses for cotton. Consumer packages for farm products, cotton fabrics for road making, cotton bagging, foundation fabrics for hooked rugs, and cotton bagging for sugar are some of the products of this coöperative arrangement.

The Textile School staff devotes considerable time each year to problems submitted to the School by mills.

The equipment available for research is listed under the Departments.

Curriculum in Textile Manufacturing

*Freshman Year

COURSES	CREDITS First Term	Second Term	Third Term
Composition, Eng. 101, 102, 103	3	3	3
Physics for Textile Students, Phys. 111, 112, 113	4	4	4
Algebra, Trigonometry, Math. 101, 102	6	6	0
Shopwork, M.E. 121, 122, 123	1	1	1
Engineering Drawing I, M.E. 101, 102, 103	2	2	2
Textile Principles, Tex. 101, 102, 103, 105	1	1	4
Military Science I, Mil. 101, 102, 103, or World History, Hist. 104	2	2	2
Fundamental Activities and Hygiene, P.E. 101, 102, 103	1	1	1
	20	20	17

*Sophomore Year

Economic History, Hist. 101, 102, 103	3	3	3
Decorative Drawing, Arch. 106, or Light in Industry, Phys. 311	3	0	0
Light in Industry, Phys. 311, or Decorative Drawing, Arch. 106	0	0	3
General Inorganic Chemistry, Chem. 101, 102, 103	4	4	4
Cotton, Cotton Classing II, F.C. 201, 212	3	3	0
Yarn Manufacture I, Tex. 201, 203, 205	1	0	4
Power Weaving, Tex. 231, 232, 234	1	3	0
Fabric Structure and Analysis, Tex. 236, 237	0	2	2
Knitting I, Tex. 207, 208, 209, 211	3	1	1
†Military Science II, Mil. 201, 202, 203	2	2	2
Sport Activities, P.E. 201, 202, 203	1	1	1
	21	19	20

* Freshman and sophomore years for all Textile curricula.

Junior Year

COURSES	CREDITS First Term	Second Term	Third Term
English, or Modern Language	3	3	3
General Economics, Econ. 201, 202, 203	3	3	3
Textile Calculations I, Tex. 345	0	0	3
Yarn Manufacture II, Tex. 301, 302, 303, 304	1	4	1
Dobby Weaving, Tex. 331, 332, 333, 334	1	1	4
Fabric Design and Analysis I, Tex. 341, 342	3	3	0
Dyeing I, Tex. 371, 372, 373, 375	4	1	1
Fabric Testing, Tex. 343	0	0	1
Electives	3	3	3
	18	18	19

Senior Year

Industrial Management, Personnel Management, Econ. 325A, 326A, 333	3	3	3
Introduction to Psychology, Psychol. 200	3	0	0
Applied Psychology, Psychol. 302	0	3	0
Industrial Psychology, Psychol. 333	0	0	3
Yarn Manufacture IV, Tex. 401, 402, 403, 405	4	1	1
Leno Design, Tex. 441	3	0	0
Dobby Design, Tex. 443	0	3	0
Jacquard Design, Tex. 445	0	0	3
Cotton and Rayon Weaving, Tex. 431, 432, 433, 435	1	1	4
Cotton and Rayon Dyeing I, Tex. 471, 472, 473, 474	1	4	1
Fabric Analysis, Tex. 451, 452	2	2	0
Electives	3	3	3
	20	20	18

† Or 6 credits in one or two of the following Departments: Economics, Psychology, History, Modern Language, Sociology.

Curriculum in Textile Chemistry and Dyeing

(The freshman and sophomore years are the same as for Textile Manufacturing.)

Junior Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
English or German	3	3	3
General Economics, Econ. 201, 202, 203	3	3	3
Introduction to Psychology, Psychol. 200, or Textile course	0	0	3
Qualitative and Quantitative Analysis, Chem. 211, 212, 223	4	4	4
Dyeing II, Tex. 377, 378, 379, 381, 382	5	5	2
Fabric Testing, Tex. 343	0	0	1
Electives	3	3	3
	18	18	19

Senior Year

Industrial Management, Personnel Management, Econ. 325A, 326A, 333	3	3	3
Organic Chemistry, Chem. 421	4	4	4
Applied Psychology, Psychol. 302, or Textile course	0	3	0
Industrial Psychology, Psychol. 338, or Textile course	0	0	3
Textile Microscopy, Tex. 489, 490	1	1	0
Textile Printing, Tex. 483, 484, 485, 487	4	1	1
Cotton and Rayon Dyeing II, Tex. 477, 478, 479, 480, 481	2	5	5
Electives	6	3	3
	20	20	19

Curriculum in Yarn Manufacturing

(The freshman and sophomore years are the same as for Textile Manufacturing.)

Junior Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
English or Modern Language	3	3	3
General Economics, Econ. 201, 202, 203	3	3	3
Accounting I, Econ. 301, 302	3	3	0
Yarn Manufacturing III, Tex. 310, 311	0	3	3
Yarn Manufacturing Lab. III, Tex. 307, 308, 309	2	2	2
Dobby Weaving, Tex. 331, 332, 333, 335	1	1	4
Dyeing I, Tex. 371, 372, 373, 375	4	1	1
Electives	3	3	3
	19	19	19

Senior Year

Industrial Management, Personnel Management, Econ. 325A, 326A, 333	3	3	3
Introduction to Psychology, Psychol. 200	3	0	0
Applied Psychology, Psychol. 302	0	3	0
Industrial Psychology, Psychol. 338	0	0	3
Machine Shop II, M.E. 227, 228, 229	1	1	1
Elements of Electrical Engineering I, E.E. 321, 322	0	3	3
Textile Calculations II, Tex. 413	3	0	0
Yarn Manufacturing V, Tex. 407, 408, 409, 411, 412	5	5	2
Manufacturing Problems, Tex. 415	0	0	3
Electives	6	3	3
	21	18	18

Curriculum in Textile Management

(The freshman and sophomore years are the same as for Textile Manufacturing.)

Junior Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
English or Modern Language	3	3	3
Accounting I, Econ. 301, 302, 303	3	3	3
General Economics, Econ 201, 202, 203	3	3	3
Yarn Manufacture II, Tex. 301, 302, 303, 304	1	4	1
Textile courses	5	2	5
Electives	3	3	3
	18	18	18

Senior Year

Industrial Management, Personnel Management, Econ. 325A, 326A, 333	3	3	3
Marketing Methods and Sales Management, Econ. 311, 312, 313	3	3	3
Introduction to Psychology, Psychol. 200	3	0	0
Applied Psychology, Psychol. 302	0	3	0
Industrial Psychology, Psychol. 338	0	0	3
Textile courses	8	8	7
Electives	3	3	3
	20	20	19
Textile courses to be selected from:			
Fabric Design and Analysis I, Tex. 341, 342	3	3	0
Dobby Weaving, Tex. 331, 332, 333, 335	1	1	4
Dyeing, Tex. 371, 372, 373, 375	4	1	1
Textile Calculations, 345 or 413	3	or	3
Yarn Manufacture IV, Tex. 401, 402, 403, 405	4	1	1
Leno Design, Tex. 441	3	0	0
Dobby Design, Tex. 443	0	3	0
Jacquard Design, Tex. 445	0	0	3
Calculating Fabric Costs, Tex. 344	0	3	0
Cotton and Rayon Weaving, Tex. 471, 472, 473, 475	1	1	4
Cotton and Rayon Dyeing, Tex. 471, 472, 473, 474	1	4	1
Fabric Analysis, Fabric Testing, Tex. 451, 452, 343	2	2	1
Manufacturing Problems, Tex. 415	0	0	3
Color in Woven Design, Tex. 455, 456	3	3	0

Curriculum in Weaving and Designing

(The freshman and sophomore years are the same as for Textile Manufacturing.)

Junior Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
English or Modern Language	3	3	3
General Economics, Econ. 201, 202, 203	3	3	3
Appreciation of Fine Arts, Arch. 111, 112, or Textile courses	3	3	0
Textile Calculations I, Tex. 345	0	0	3
Fabric Design and Analysis I, Tex. 341, 342	3	3	0
Jacquard Design, Tex. 445	0	0	3
Dobby Weaving, Tex. 335, 337, 338, 339	2	2	5
Fabric Testing, Tex. 343	0	0	1
Electives	3	3	3
	17	17	21

Senior Year

Industrial Management, Personnel Management, Econ. 325A, 326A, 333	3	3	3
Introduction to Psychology, Psychol. 200	3	0	0
Applied Psychology, Psychol. 302	0	3	0
Industrial Psychology, Psychol. 338	0	0	3
Leno Design, Tex. 441	3	0	0
Dobby Design, Tex. 443	0	3	0
Fabric Design and Analysis II, Tex. 453	0	0	3
Jacquard Design Laboratory, Tex. 447, 448, 449	1	1	1
Color in Woven Design, Tex. 455, 456	3	3	0
Cotton and Rayon Weaving, Tex. 435, 437, 438, 439	2	2	5
Fabric Analysis, Tex. 451, 452	2	2	0
Electives	3	3	3
	20	20	18

DIVISION OF TEACHER TRAINING

Professors: T. E. BROWNE, M.A., *Director of the Division.*
LEON E. COOK, M.S., *Agricultural Education.*
EDWARD W. BOSHART, M.A., *Industrial Arts Education, and Guidance.*
KARL C. GARRISON, Ph.D., *Psychology.*
Associate Professors: J. K. COGGIN, M.S., *Agricultural Education.*
L. O. ARMSTRONG, M.S., *Agricultural Education.*
J. WARREN SMITH, M. S., *Industrial Education.*
Instructor: WILLIAM MCGEHEE, M.A. *Psychology.*

Purposes.—The Division of Teacher Training at State College, operating as a local Division of the Division of Teacher Training of the Greater University of North Carolina, has imposed upon it the responsibility of training teachers of Agriculture, of Trades and Industries and of Industrial Arts. As further emphasizing the importance of the work, the State Board for Vocational Education has designated State College for training men as teachers of these subjects in white schools, and as counselors to students in choosing their vocations. Following this action, Federal appropriations to the State under the Smith-Hughes and the George-Deen Acts of Congress for such teacher training are allotted to the College.

Organization.—The Division offers curricula for training teachers of Agriculture, of Industrial Arts Education, of Industrial Education and Occupational Information and Guidance. The training includes four definite objectives. The first embraces the fundamentals of general education: English, Mathematics, the natural sciences — Biology, Chemistry, Physics — Economics, Sociology, and History. These subjects are given in the Basic Division of the College. Next are the technical subjects selected according to the professional course of the student: for Agricultural Teaching, in the School of Agriculture; for Industrial Arts and Industrial Education, in the School of Engineering. In the third group are the principles and methods of teaching and of vocational guidance. Educational Psychology here is obviously essential. The last objective is practical experience. To meet the requirements of the State Department of Public Instruction for teaching certificates, students, before graduation, observe and teach under the direction of the faculty of the Division in selected high schools. Moreover, experience in the respective occupations is required for those preparing to teach agriculture and the trades and industries.

Psychology.—General Psychology, giving an understanding of man's reactions to individual and social forces, constitutes one of the fundamentals of liberal education. Educational Psychology, applying the general principles to the problems of instruction, learning, and character building, becomes obviously essential in the equipment of teachers. Courses in Applied, Industrial, and Social Psychology of specialized nature meet the needs of the various technological curricula. The Department of Psychology in view of its intimate relationship to the problems of teacher training is

incorporated administratively in the Division of Teacher Training and at the same time functions instructionally throughout the Basic Division and the Professional Schools.

Requirements for Graduation.—For graduation in the Division of Teacher Training, the scholastic requirement in all curricula is the satisfactory attainment of at least 225 term credits with not fewer than an equal number of honor points.

Of the term credits required for graduation, a student must have at least 27 in Education, 18 in Language, 18 in the Natural Sciences, 18 in Social Science, 12 in Military Training or alternatives, 6 in Physical Education. Subjects must be taken as indicated in the several curricula.

Students who enter with advanced standing are allowed one point for each term credit accepted.

Further requirements consist of practice teaching in the subject and practical experience in the work to be taught as indicated above, or under the several Departments.

Degrees.—Upon the satisfactory completion of one of the curricula in Education, a student is awarded the degree of Bachelor of Science with the name of his special curriculum appended: in Agricultural Education, in Industrial Arts Education, in Industrial Education.

The Graduate Division of State College offers the Master's Degree to mature students of distinguished ability upon successful completion of its requirements. For the details, see the statement of the Graduate Division in this Catalog.

Agricultural Education

LEON E. COOK

Object.—Agricultural Education is designed to prepare students for positions as teachers of vocational agriculture in the high schools of the State, and to qualify as such under the provisions of the Smith-Hughes and George-Deen Acts of Congress.

The curriculum is comprehensive in nature. It is, of course, essential that teachers have a good foundation in English and in the sciences basic to an understanding of agriculture. They should also have a sufficient understanding of the social sciences to appreciate the developments of contemporary life, with emphasis on those having to do with agriculture and the rural community. Manifestly they should have a grasp of agriculture in all phases of importance in the State, including the improvement of the farm home and of the social as well as of the economic development of the rural community. Proficiency in teaching vocational agriculture depends upon comprehensive and thorough preparation in the professional field with emphasis on personal relationships and guidance, procedure in teaching both youth and adults, and in handling the various responsibilities of community service.

An adequate background of farm experience is essential for students looking forward to agricultural teaching, and experience in fields related to farming is desirable. A student should be farm reared or should have a minimum of two years of farm experience as a part of his preparation for teaching vocational agriculture.

Placement of Graduates.—There has been a strong demand for teachers of vocational agriculture with little difficulty in placing students who are qualified from the standpoint of personality, character, training, and farm experience. A coöperative arrangement with the supervisory staff in agricultural education of the State Department of Public Instruction facilitates the placement of students in situations adapted to their experience and training.

Successful teachers of agriculture are in demand for higher positions in the educational service and by other agencies for positions offering higher salaries than those paid in the teaching profession.

Graduate Study.—The Department provides opportunities for students, fully qualified, to do graduate work in Agricultural Education. Graduate students taking majors in this field should have completed the undergraduate work in Agricultural Education or the equivalent. Transfer students, or graduates in general agriculture who did not take the work in education, are required to complete 15 credits in education including Principles of Teaching and Methods of Teaching Agriculture, as pre-requisites to graduate study.

Curriculum For Teachers Of Agriculture

Freshman Year

COURSES	CREDITS First Term	Second Term	Third Term
Composition, Eng. 101, 102, 103	3	3	3
General Inorganic Chemistry, Chem. 101, 102, 103	4	4	4
General Botany, Bot. 102	0	4	0
General Zoology, Zool. 101	4	0	0
Mathematical Analysis, Math. 100 a-b-c	3	3	3
Economic History, Hist. 101, 102, 103	3	3	3
Physical Geology, Geol. 120	0	0	4
Military Science I, Mil. 101, 102, 103, or Alt.			
Human Relations, Soc. 101, 102, 103	2	2	2
Fundamental Activities and Hygiene, P.E. 101, 102, 103	1	1	1
	20	20	20

Sophomore Year

Farm Equipment, Agr. Eng. 202	3	0	0
Soils, Soils 201	0	0	4
General Economics, Econ. 201-2	3	3	0
Agricultural Economics, Agr. Econ. 202	0	0	3
Physics for Agr. Students, Phys. 115	5	0	0
Animal, Physiology, Zool. 202, or			
Plant Physiology, Bot. 221	0	0	5
Economic Zoology, Zool. 102	0	4	0
General Botany, Bot. 101	4	0	0
Introduction to Organic Chemistry, Chem. 221	0	4	0
Animal Nutrition I, A.H. 202	0	3	0
General Poultry, Poul. 201	0	3	0
Principles of Forestry, For. 111	3	0	0
General Horticulture, Hort. 203	0	0	3
General Field Crops, F.C. 202	0	0	3
Military Science II, Mil. 201, 202, 203, or Alt.	2	2	2
Sport Activities, P.E. 201, 202, 203	1	1	1
	21	20	21

Junior Year

English, elective	3	0	3
Educational Psychology, Ed. 203	3	3	0
Visual Aids, Ed. 308	0	0	3
Teaching Farm Shop Work, Agr. Eng. 331, 332	3	3	0
Farm Management, Agr. Econ. 303	0	0	3
Farm Accounting, Agr. Econ. 313	0	0	3
Soil Fertility, Soils 221	3	0	0
Principles and Use of Fertilizers, Soils 402	0	3	0
Rural Sociology, Rural Soc. 302	0	3	0
*Diseases of Field Crops, Bot. 301	3	0	0
Economic Entomology, Zool. 213	0	0	4
**Electives	6	6	3
	21	18	19

Senior Year

English, elective	0	0	3
Materials and Methods in Teaching Agriculture, Ed. 412	0	5	0
Secondary Education in Agriculture, Ed. 426	0	0	3
Principles of Teaching, Ed. 406	3	0	0
Observation and Directed Teaching, Ed. 408	0	5	0
Methods of Teaching Agriculture, Ed. 407	5	0	0
Evening Classes and Community Work, Ed. 411	0	5	0
***Animal Hygiene and Sanitation, A.H. 353	0	0	3
Agricultural Marketing, Agr. Econ. 411	3	0	0
Community Organization, Rural Soc. 413	0	0	3
**Electives	4	0	3
	15	15	15

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* Diseases of Fruits and Vegetable Crops, Bot. 303, may be substituted for Bot. 301.

** Options and electives must be chosen with the approval of the adviser and the electives must include at least 19 credits in Agriculture.

*** Common Diseases, A.H. 352, may be substituted for A. H. 353.

Industrial Arts Education

EDWARD W. BOSHART

Object.—For nearly half a century North Carolina State College of Agriculture and Engineering has had a large part in the preparations of individuals and the development of facilities to meet the problems related to the growth of industries throughout the State. As a part of this effort the training of teachers qualified to give instruction in the Industrial Arts is becoming more important. The emphasis of this Department is on phases of practical education which will give clearer meanings to life problems.

Organizations.—The courses in Industrial Arts Education have been formulated to prepare teachers for the public schools where they will have charge of classes in elementary activities, shopwork, and drawing. The successful completion of this curriculum leads to the degree of Bachelor of Science in Industrial Arts Education and to the earning of an A-grade certificate for teaching subjects in this field.

The first two years of this curriculum are in line with the general plan of the College which emphasizes work of fundamental value. The last two years are given to work of a professional and specialized nature, in this Department stressing analysis of occupations and trades, vocational guidance, and school-shop organization and administration.

Professional Objectives.—The curriculum is intended for those who wish to become teachers, heads of departments, supervisors, or directors of industrial arts in the public schools. Men with this preparation are those who, with continued study, become the leaders in their field.

Vocational Guidance.—One of the causes of failure in education and in after life lies in lack of early guidance, based on mental and physical qualities, personal aptitudes, and background toward the choice of an individual's lifework. Though as yet not perfectly developed, much has been learned in vocational guidance that is helpful in avoiding a misfit in education and in subseqeunt work. Teachers are those upon whom, working as collaborators with colleges and families, must fall the burden of these momentous choices. Through courses in tests and measurements and the requirements of various occupations, trades, and professions, State College is endeavoring to prepare teachers of high schools to become counselors of students in leading them through choice of congenial vocations toward successful and happy lives.

Curriculum for Teachers of Industrial Arts

Freshman Year

Courses	Credits *First Term*	*Second Term*	*Third Term*
Composition, Eng. 101, 102, 103	3	3	3
Mathematical Analysis, Math. 100 a, b, c	3	3	3
General Chemistry, or Optional Science	4	4	4
Engineering Drawing II, M.E. 105, 106	3	3	0
Descriptive Geometry, M.E. 107	0	0	3
Industrial Arts, Ed. 106	3	3	3
Military Science I, Mil. 101, 102, 103, or World History, Hist. 104	2	2	2
Fundamental Activities and Hygiene, P.E. 101, 102, 103	1	1	1
	19	19	19

Sophomore Year

Business English, Eng. 120, Advanced Composition, Eng. 222, Public Speaking, Eng. 211	3	3	3
General Physics, Phys. 105, 106, 107	4	4	4
Economic History, Hist. 101, 102, 103	3	3	3
Freehand Drawing I, Pen and Pencil Drawing, Arch. 101	2	0	0
Freehand Drawing II, Water Color, Arch. 102	0	2	0
Pencil Sketching, Arch. 103	0	0	3
General Sociology, Soc. 202, 203	3	3	0
Forge, Foundry, and Pattern Making, M.E. 124-5-6	2	2	2
Military Science II, Mil. 201, 202, 203, or Elective	2	2	2
Sports Activities, P.E. 201, 202, 203	1	1	1
Elective	0	0	3
	20	20	21

Junior Year

Educational Psychology, Ed. 203	3	3	0
Problems in Secondary Education, Ed. 344	0	0	3
General Economics, Econ. 201, 202, 203	3	3	3
Business Law, Econ. 307	0	0	3
Labor Problems, Econ. 331	0	0	3
Project Design, Ed. 332	3	3	0
Visual Aids, Ed. 308	0	0	3
Machine Shop, M.E. 235, 236	3	3	0
Sheet Metal Shop	3	3	0
Carpentry	3	3	0
Shop Planning, Ed. 326	0	0	3
	18	18	18

Senior Year

Field Work in Secondary Education, Ed. 433	0	3	0
Vocational Guidance, Ed. 420	0	0	3
Methods in Teaching Industrial Arts, Ed. 422	3	0	0
Observation and Directed Teaching, Ed. 444	0	3	3
Industrial Relations	3	0	0
Occupational Studies, Ed. 424	0	0	3
Printing	3	3	3
Furniture Design, M.E. 237-8-9	3	3	3
Electives	6	6	3
	18	18	18

Curriculum for Teachers of Occupational Information and Guidance

Freshman Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Composition, English 101, 102, 103	3	3	3
Mathematical Analysis, Math. 100 a, b, c	3	3	3
Science	4	4	4
Economic History, Hist. 101, 102, 103	3	3	3
Occupations, Ed. 103	0	0	3
Historical Geology, Geol. 222	0	3	0
Physical Geology, Geol. 120	4	0	0
Military Science I, Mil. 101, 102, 103, or World History, Hist. 104	2	2	2
Fundamental Activities and Hygiene, P.E. 101, 102, 103	1	1	1
	20	19	19

Sophomore Year

Business English, Eng. 211, Advanced Composition, Eng. 222, Public Speaking, Eng. 231	3	3	3
Science	4	4	4
General Sociology, Eoc. 202, 203	3	3	0
Psychology, Psychol. 200	3	0	0
Social Psychology, Psychol. 290	0	3	0
Psychology of Personality, Psychol. 291	0	0	3
Physiography, Geol. 303	0	0	3
Military Science II, Mil. 201, 202, 202, or Elective	2	2	2
Sport Activities, P.E. 201, 202, 203	1	1	1
*Electives	3	3	3
	19	19	19

Junior Year

English or Modern Language	3	3	3
Educational Psychology, Ed. 203	3	3	0
General Economics, Econ. 103	3	3	3
Business Law, Econ. 211	3	0	0
Problems in Secondary Education, Ed. 332	0	0	3
Visual Aids, Ed. 208	0	0	3
American Government, Gov. 200	3	3	3
Occupational Studies, Ed. 324	0	3	0
*Electives	4	4	4
	19	19	19

Senior Year

Field Work in Secondary Education, Ed. 333	0	3	0
Vocational Guidance, Ed. 320	0	0	3
Observation and Directed Teaching, Ed. 344	0	3	3
Methods of Teaching Occupations, Ed. 426	3	0	0
Measurements in Educational Psychology, Psychol. 468	3	0	0
Social Recreation, P.E. 401	0	0	3
*Electives	12	12	9
	18	18	18

* Electives to be selected with aid of adviser to meet special needs of individual students.

Industrial Education

J. WARREN SMITH

Object.—In a greater degree than at any previous time, thought is now directed toward an extended program of trade-shop courses in Industrial Education for North Carolina high schools. Some of the factors which have contributed to this focus of attention are: unemployment, rising age for entrance to work, increasing school enrollment, and an extended school term. It is to prepare teachers for this field of service that this program is designed. A four-year course is outlined with the first two years running parallel with that of industrial arts, then specializing by following the outlined course during the last two years.

Positions For Graduates.—The student who completes this course will be prepared to teach in the all-day schools or the part-time or the evening classes, such as are supported by State and Federal funds for vocational education. At the present time, little difficulty should be encountered by the successful candidates in securing positions after graduation.

Journeyman Experience Required.—Candidates for degrees must have had at least two years of successful journeyman experience in the trade they wish to teach. Successful completion of this course leads to the degree of Bachelor of Science in Industrial Education. Men with journeyman experience who desire to take only professional courses, may enter as special students with the object of completing one or two years of training as outlined for the junior and senior years. For this work, no degree would be granted.

This Department is recognized as the official training Department of Industrial Education for the State Department of Education. The head of the Department serves as itinerant teacher-trainer for part-time, day-trade, and evening classes, and for the preparation of prospective teachers.

For the time being, the services of the Head of this Department will be devoted largely to itinerant-teacher training. However, as the demand for resident courses at State College designed to prepare shop teachers develops, the schedule can be adjusted to meet this demand.

Curriculum for Teachers of Industrial Education

For freshman and sophomore years, see Industrial Arts Education.

Junior Year

COURSES	CREDITS *First Term*	*Second Term*	*Third Term*
Principles of Industrial Education, Ed. 327	0	3	0
*Shopwork (selected)	3	3	3
Educational Psychology, Ed. 416	3	3	0
Vocational Guidance and Student Selection, Ed. 320	0	0	3
Organization of Teaching Materials, Ed. 361	3	3	3
Industrial Psychology, Psychol. 238	0	0	3
Problems in Secondary Education, Ed. 332	0	0	3
Labor Problems, Ed. 340	0	0	3
General Sociology, Soc. 103	3	3	0
Visual Aids, Ed. 208	0	0	3
Mechanical Drawing, M.E. 111, 112, 113 (Special students who have not had M.E. 105, 106, 107, should substitute those courses for 111, 112, 113.)	2	2	2
†Electives	6	3	0
	20	20	20

Senior Year

Local Survey; Planning a Program, Ed. 416	0	3	0
*Shopwork (selected)	0	3	0
Methods of Teaching Industrial Education, Ed. 422	3	0	0
Observation and Teaching, Ed. 444	0	3	3
Occupational Studies, Ed. 424	0	0	3
Shop Planning and Equipment, Ed. 426	3	0	0
Furniture Designs and Rod-Making, M.E. 237, 238, 239, or Machine Design, M.E. 311, 312, 313	3	3	3
†Electives	9	6	9
	18	18	18

* Elective shopwork should be taken in fields available as Textiles, Woodshop, Machine Shop, Foundry, and Electricity.

† Elective courses must be approved by the faculty adviser.

THE DEPARTMENT OF MILITARY TRAINING

The Military Department: The Reserve Officers Training Corps

The Reserve Officers Training Corps, the official designation of the military organization at State College, conducts the work in two courses of two years each:

The Basic Course.—A required corse for all physically fit freshmen and sophomores.

The Advanced Course.—Elective and selective for juniors and seniors who have successfully completed the Basic Course. Satisfactory completion of the Advanced Course leads to a commission as Second Lieutenant of Infantry in the Officers Reserve Corps. Students holding such a commission are assigned, after graduation, to an Army Reserve Unit, usually in their own localities.

Military Science I discusses in class such subjects as: the National Defense Act, Military Courtesy and Discipline, Hygiene and First Aid, Military Organization, Current International Situation, and Military History. One hour per week is devoted to classroom instruction.

Military Science II discusses Leadership, Scouting and Patrolling, Combat Principles of small units, Interior Guard Duty, and Military History. One hour per week is devoted to classroom instruction.

Drill.—Students enrolled in the Basic Course are required to spend three one-hour drill periods per week on Battalion drill fields. Here they are schooled in drill, military bearing and neatness, courtesy, leadership, posture, and teamwork, under the direct command of Cadet officers of the Senior Class.

Military Science III discusses Leadership, Aerial Photography, Supply and Mess Management, Care of Animals, Operation of Motor Vehicles, Defense against Chemical Agents, Combat Principles and Defensive Tactics. Three one-hour classroom periods are required.

Military Science IV discusses Leadership, Military Law, Military History, Anti-Aircraft Defense, Infantry Weapons and Unit Organization, Combat Intelligence and Signal Communications. Three one-hour classroom periods are required.

Drill.—Students enrolled in the Advanced Course are required to attend three one-hour drill periods per week on the Battalion drill fields where they act as cadet officer or cadet non-commissioned officer instructors of the various Infantry units.

Uniforms, Equipment, Fees

Army Officers.—The Federal Government details officers of the Regular Army as Instructors in the ROTC. The senior instructor is designated by the War Department as Professor of Military Science and Tactics. The Regular Army officers conduct all classroom instruction and supervise the instruction of the cadet officers on the drill fields.

Uniforms.—Uniforms for Basic Course students, and all instructional equipment are provided by the Federal Government. These are loaned to the Institution which is accountable to the Federal Government for their proper care and use.

Financial Aid.—Members of the Advanced Course are paid a specified amount by the Federal Government toward the purchase of their uniforms. These uniforms are made in the pattern of the Army Officer uniform and can be used by the student for several years after he has received his commission in the Reserve Corps. In addition, the Advance Course student receives from the Federal Government a daily pay amounting to approximately twenty-five cents per day. An Advance Course student who withdraws from College prior to graduation must adjust his uniform account with the Military Department prior to departure from the campus.

Deposit.—A deposit of ten dollars is required of each student member of the ROTC., as insurance against loss of equipment or damage thereto. A refund is made upon the return of the equipment in good condition.

Expenses.—Approximately $6.50 is required by each student in the ROTC for the purchase of uniform shoes and other special articles not issued by the Government.

Organization.—The ROTC at State College is organized into the following units:

An Infantry Regiment of three battalions, organized for training purposes.

A Military Band, supervised and trained by the Director of Music of the College. Instruments are provided by the Federal Government. Membership is open to all student musicians who can qualify. Time is given for instruction in concert music in addition to military-band music.

A Military Drum and Bugle Corps, supervised and trained by cadet officers. Instruments are provided by the Military Department.

Credits.—Credit is allowed for work at other institutions having an ROTC Unit established in accordance with the provisions of the National Defense Act and Army Regulations. Record of a students prior training in ROTC is obtained by the Military Department from the institution concerned.

Educaional Value.—The immediate purpose of the ROTC is to train officers for service in defense of the country in an emergency. This is clearly stated in the National Defense Act of Congress. The ROTC at State College is in no sense militaristic. As a by-product, the general educational value of the training for any profession in civil life is of incalculable greatness. Military discipline best instills the principle that to be a leader or to command one must first learn to obey. The training gives the advanced course student ample opportunity to practice the leadership of men resulting in self-confidence, initiative, and courage. Habits of regularity, of punctuality, of

thoroughness in every duty, of respect for one's seniors are inculcated, along with neatness in dress and cleanliness in person. The importance of correct posture and bearing in social and business intercourse, as well as for health, is implanted.

The standard of discipline desired by the Military Department is exactly the same as the standard most helpful to fit college graduates to become honorable and outstanding members of their communities, in whatever profession or calling they may engage.

The Graduate School of the University of North Carolina
STATE COLLEGE DIVISION

WILLIAM WHATLEY PIERSON, JR., *Dean*, Chapel Hill
R. F. POOLE, Chairman of Committee on Graduate Instruction at State College

Organization

Purposes.—Graduate Instruction in this institution is organized to formulate and develop graduate study and research in the fields primarily of Agriculture, Engineering, and Textile Manufacturing, and the training of teachers of these subjects. The urgent need for graduate instruction leading to research in these fields is recognized by the leaders in the occupations which depend upon the development of these branches of industry. State College, therefore, offers training for teachers, investigators, and leaders in Agriculture, Engineering, and Manufacturing. Moreover, unless graduate study and research in the technological and related fields are provided, the institutions of higher learning in this section of the country will look elsewhere for trained men, whereas there should be a fair balance of such men from every section of the country.

Administration.—Subject to the final approval of the Faculty Council, graduate work is directed by a Committee on Graduate Instruction. All subjects to be taken by graduate students are passed upon by the College Committee on Courses of Study. Actual instruction is given by the regular members of the faculty under the supervision of the Director of Instruction, the Head of the Department, or the Dean of the School in which the student is working.

Facilities.—State College offers exceptional facilities and opportunities for research. The Agricultural Experiment Station of North Carolina, the Engineering Experiment Station, and the Research Laboratories of the Textile School are integral parts of the college. In the Textile School, besides the research carried on by regular members of the staff, the Bureau of Agricultural Economics and other Bureaus at Washington have, for some years, used the facilities of the School for special research. Graduate students have the advantages offered by all these agencies in addition to the regular laboratories used for instruction.

In its undeveloped resources and raw materials, as well as in its going concerns in business and industry, in its varied topography and products, North Carolina is a rich field for research. The State is already imbued with a spirit of progress stimulating to intellectual growth.

Scholarships and Fellowships.—The College offers annually graduate fellowships and a number of teaching and research fellowships. Besides these, special fellowships are supported by large business organizations.

College Fellowships give tuition and a stipend of $450 an academic year,

paid in nine equal installments, a month apart, beginning October 25. The holder of a fellowship may be required to render a maximum of ten hours a week of service to the department in which he is specializing.

Teaching and Research Fellowships give $600 or more an academic year. The holder of one of these fellowships may not carry more than half a full schedule of graduate studies. The rest of his time must be given to teaching in classroom or laboratory or to research in one of the Experiment Stations.

The Honor Society of Phi Kappa Phi Fellowship, State College Chapter, offers $50 annually, preferably to a member of the Society, to assist in promoting research, and advanced training of worthy students.

Special Fellowships have for some years been maintained by business or manufacturing organizations desirous of having research made on certain problems pertaining to their interests. Some organizations maintaining these scholarships have been the National Fertilizer Association, the N. V. Potash Export My., the American Cyanimid Company, the Superphosphate Institute, E. I. DuPont de Nemours Company, the Niagara Sprayer and Chemical Company, Eli Lilly and Company, the American Potash Institute, and the North Western Yeast Company. The stipends afforded by these fellowships have varied from $720 to $1,500 for twelve months. It is hoped that some of these may be available every year.

Admission and Degrees

Degrees in Residence

Master of Science in Agriculture — Master of Science in Education
Master of Science in Engineering — Master of Science in Textiles
Master of Science (pure, not applied)

Admission.—1. A candidate for admission to graduate study must present an authorized transcript of his collegiate record as evidence that the candidate holds a bachelor's degree for a four years' undergraduate course from a college whose standards are equivalent to those of State College.

2. Admission to courses of graduate work does not necessarily mean that a student may immediately become a candidate for an advanced degree. If the student is not prepared to do graduate work at once, he may pursue undergraduate courses which will best fit him for advanced work.

3. A member of the senior class of State College may, upon the approval of the Committee on Graduate Instruction, register for graduate courses to fill a roster of studies not to exceed eighteen credits for any term.

Regulations

Credits.—1. For all master of science degrees, forty-five term credits are required, a credit being given for each hour of class work successfully com-

pleted through a term. Besides the term credits, for all master of science degrees a thesis must be written and approved.

2. Not more than ten of the academic credits required for a graduate degree will be accepted from other institutions.

3. No graduate credit will be allowed for excess undergraduate credit from any other institution.

Courses of Study.—As designated in the College Catalog under Description of Courses, the courses numbered 500 to 599 are for graduate students only, and those numbered 400 to 499 are for graduates and advanced undergraduates.

The program of the student shall contain at least twelve credits in courses of the 500 group. Nine credits in this group may be obtained in approved research courses. A maximum of 33 credits may be gained in the 400 group. A minimum grade of "B" must be made on all courses to obtain graduate credit.

The student's program of studies, made under the supervision of the student's adviser, must be approved by the Dean of the School in which the student is specializing and finally by the Committee on Graduate Instruction.

Language Requirements.—A reading knowledge of at least one modern foreign language is required for candidates for the Master's degree. The knowledge will be tested by a special examination by the language department.

Thesis.—A graduate student, candidate for the Master's degree, must prepare under the supervision of the student's adviser a thesis upon a subject, approved by the adviser, in the field of the student's special work. Two copies, the original and the first carbon, of the completed thesis must be presented to the Committee on Graduate Instruction at least one month before the degree is awarded.

Residence.—A candidate for a degree of Master of Science is required to be in residence at the College, pursuing graduate work, one full academic year of three terms. The candidate is not permitted to take course leading to forty-five credits in a shorter time.

Six summer schools of six weeks in residence at the College are reckoned sufficient to fulfill the residenc requirement. By specific approval of the Committee on Graduate Instruction, one summer period may be spent away from the College if devoted to the preparation of the thesis required for graduation.

In special cases it is possible for graduate students to do twelve weeks work during a summer session, provided instructors will remain at the College throughout the summer. Under these provisions a minimum of four summer sessions, two of twelve weeks and two of six weeks, are required for residence.

Class Work and Examinations.—As a mature student admitted to graduate study only after ability and earnestness are established, the graduate student is expected to assume greater individual responsibility, and since specializing, to work in a more comprehensive manner than the undergraduate. However, in preparation, in attendance, and in all the routine of class work, the graduate student is subject to the regulations observed in other divisions of the College.

Besides the examinations in class, the graduate student, at least two weeks prior to graduation, has a general examination on his work.

PROFESSIONAL DEGREES

Master of Agriculture
Master of Textiles
Ceramic Engineer
Chemical Engineer
Civil Engineer
Electrical Engineer
Mechanical Engineer

Significance.—The professional degrees are not honorary; they are tests of ability and testimonials of accomplishment. To merit the professional degree, a candidate must, in his thesis, demonstrate his ability to attack and to solve a new problem of sufficient complexity to require distinctly original processes of thought, and the solution of which shall make, however small, yet a real contribution to his profession. The record of his work must demonstrate his power to conceive, to plan, to organize, to carry through to completion a project of considerable magnitude. The candidates should quite obviously have grown professionally since his graduation and evince intellectual vitality to guarantee the continuance of his growth.

Requirements.—1. A professional degree may be conferred upon a graduate of State College in the School in which the candidate received the Bachelor's degree; the degree of Master of Agriculture may be conferred upon graduates of other institutions who have performed outstanding professional service in agriculture for the State of North Carolina for a continuous period of not less than five years.

2. The degree of Master of Agriculture may be conferred upon graduates of State College after five years of service in agriculture, upon the acceptance of a thesis.

The degree in Engineering or in Textiles may be conferred upon graduates of State College after five years' professional practice in responsible charge of important work, upon the acceptance of a thesis on a subject related to the practice in which the applicant has been engaged.

3. Application for the degree must be presented to the Committee on Graduate Instruction not less than nine months before the degree may be conferred.

4. With the application for a degree, the candidate must present, as preliminary basis for the degree, (1) the subject of a thesis he purposes to write, and (2) a statement in outline of his professional work since graduation, both of which must be approved by the Committee.

5. The completed thesis must be submitted, on or before April 1, to the committee for consideration, and with it a detailed statement, duly certified, of the candidate's professional work since graduation, upon which, in addition to the thesis, the degree is to be awarded.

6. Upon notification that thesis and work have been approved by the Committee as worthy basis for the degree, the candidate shall, upon a specified date, appear before the Committee for oral or written examination on his work and his thesis. Upon the recommendation of the candidate's committee, the examination may be given through correspondence.

Fees

The Graduate student will pay $5.00 when he matriculates and $3.00 a credit hour for all courses.

The Professional candidate will pay $10.00 when he matriculates and $15.00 for his diploma.

Correspondence about graduate work should preferably be addressed to the Chairman of the Committee on Graduate Instruction.

DIVISION OF COLLEGE EXTENSION

EDWARD W. RUGGLES, *Director*

Purpose.—The College Extension Division is organized to carry the practical and cultural advantage of college studies to persons who cannot attend classes on the campus, and to groups and communities that may profit by the service offered through the following means.

Extension Classes are organized where at least fifteen persons are interested and willing to take up the same subject. Such matters as the distance from the college, the nature of the subject, and the availability of instructors must be taken into consideration.

Correspondence Courses for college credit are offered in Agronomy, Animal Husbandry, Horticulture, Soils, Poultry, Agricultural Economics, Rural Sociology, Chemistry, Education, Economics, English, Geology, History, Architectural Engineering, Ceramic Engineering, Mechanical Engineering, Mathematics, Modern Languages, Sociology, and Zoölogy. The list of these courses is being added to as rapidly as possible. Complete information concerning them is included in the Bulletin of Correspondence Courses.

Correspondence Courses of a practical nature are offered in Business English, Industrial Electricity, Land Surveying, Plumbing, Engineering Drawing, Air Conditioning, Heating and Ventilation, and Mathematics. In addition, the courses in Ceramic Engineering may be taken as practical where no credit is desired.

Short Courses are offered by the College Extension Division to tie up the facilities of the several Schools of State College with the trades and industries of North Carolina into a permanent educational program. In carrying out this program, short courses of a practical nature are offered every year which are increasing in popularity. During the present school year (1938-39), the following short courses and institutes are scheduled: Air Conditioning, Electrical Meters and Relays, Engineers, Surveyors, and Plumbing and Heating Contractors, Gas-Plant Operators, and Water-Works Men, Retail Coal Merchants, Electrical Contractors, Street Superintendents, Amateur Photographers, Sanitarians, and Building Inspectors. Additional courses are being added as the demand arises.

College Extension Lectures by members of the factulty and concerts by the College musical organizations are available to any high school, civic club, woman's club, science club, agricultural or engineering meeting or organization, desiring to put on a good lecture or musical program.

Reading Courses are offered to graduates and undergraduates who desire to continue their intellectual growth and to keep abreast of the advances made both in their specific field and in relating fields.

Bulletins describing the various functions of the Division will be gladly supplied on request. Write to Edward W. Ruggles, Director, College Extension Division, North Carolina State College, Raleigh, North Carolina.

Full Information.—Any person interested in extension classes or correspondence courses should write to the College Extension Division, requesting the Extension Bulletin, which contains complete information concerning methods of instruction, fees, and the conditions upon which College credit will be granted.

THE SUMMER SESSION

Time: Work.—Beginning June 12, 1939, the Summer Session will continue six weeks. The work, directed by the regular College Officers of Administration and conducted largely by the Faculty, maintains the College standards and warrants College credit toward degrees.

Advantages.—Special advantages are offered those desiring to get teachers' certificates, or to renew or raise the grade of a certificate; also to teachers with ambition to advance culturally and professionally. College students may remove conditions or gain additional credits. Applicants for admission to College may add needed credits for entrance.

Cultural Courses.—Although the Summer Session at State College conducts courses specifically technical in Agriculture, Engineering, and Textile, and confines its Teacher Training to these departments, general courses of broad cultural value are offered in English, Modern Languages, Mathematics, Chemistry, Physics, Botany, Zoölogy, and the Social Sciences.

Full Information regarding the Summer Session is given in the Summer Session issue of *State College Record*, which may be obtained from W. L. Mayer, Registrar, State College Station, Raleigh.

IV. DESCRIPTION OF COURSES

AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY

Professors: G. W. Forster, Head of the Department; Marc C. Leager.
Associate Professor: S. L. Clement.
Assistant Professors: R. E. L. Greene (Acting), M. Taylor Matthews, Glenn R. Smith, Robin M. Williams.
Instructor: Ralph H. Raper (Acting).

Facilities.—The Department of Agricultural Economics and Rural Sociology is supplied with modern laboratory facilities. The Department has at its disposal several large, well-lighted offices, classrooms, and laboratories. By special arrangement with one of the large calculating-machine manufacturing companies, the supply of calculators is adjusted to the need for them. In addition, the Department has adding machines and other calculating devices, including an 80-column Hollerith tabulating and sorting machine. Charts on practically every phase of Agricultural Economics are at hand or are available through the courtesy of the United States Department of Agriculture. A large number of maps of farms located in various parts of the State are a basis for study and for illustrating principles and practices. For the study of farm management and farm organization, the department has collected during the past five years detailed records on approximately a hundred farms. Maintained for reference is an up-to-date file of bulletins covering all phases of agricultural economics and rural sociology.

The State a Laboratory.—In reality, the State is a laboratory of the Department, which is constantly making studies in economics of production, marketing, finance, taxation, and prices, as well as studies in such rural social problems as rural population, rural organization, family living, and community life. All of these studies furnish material for the student, and also for the instructor in preparing and developing the courses of instruction. It is significant to note that much of this work is done in coöperation with the United States Department of Agricultural Economics and other agencies of the Federal Government. This arrangement brings the student in contact with various Government officials and also supplements the Department's personnel.

Agricultural Economics

Courses for Advanced Undergraduates

Agr. Econ. 202. Agricultural Economics. 0-3-0 or 0-0-3

Required of sophomores in Agriculture. Prerequisite: Econ. 205 or Econ. 201-202-203.

A study of the economics of agricultural production, the marketing of farm products, farm credit, land tenure and other major economic problems of the farmer. Messrs. Clement, Forster, Leager.

Agri. Econ. 212. Land Economics. 0-3-0 or 0-0-3

Required of sophomores in Forestry. Prerequisite: Econ 205 or 201-202-203.

The problems of land economics including land classification and land use with special emphasis on forest land, land ownership and control, the principles of land valuation, policies of land settlement and development, the taxation of forest lands. Mr. Forster.

Agr. Econ. 303. Farm Management I. 0-0-3

Required of juniors in Agricultural Economics, Agriculture and Vocational Education. Prerequisite: Econ. 205 or 201-202-203.

The principles involved in the successful operation of the farm, farm planning, management of labor, farm work programs, use of machinery, and farm administration. Mr. Forster.

Agr. Econ. 313. Farm Accounting. 0-0-3

Required of juniors in Vocational Agriculture. Prerequisite: Econ 205.

The practical aspects of farm accounting, preparation of inventories of farm property, simple financial statements, method of keeping farm records, analysis and the interpretation of results obtained from farm business transactions. Mr. Leager.

Agr. Econ. 322, 323. Grades, Standards, and Inspection. 0-3-3

Elective for seniors in Agricultural Economics. Prerequisite: Econ. 205 or 201-202-203.

History of the grades and standards of important agricultural products, together with the technic of inspection. Mr. .....

Agr. Econ. 332. History of the Agricultural Adjustment Program 1935-1938, Inclusive. 0-3-0

Elective for juniors and seniors in Agriculture.

A comprehensive study of the economics of the Agricultural Adjustment Acts of 1933-1935 and 1938, and of the Agricultural Conservation Program in 1936, 1937, and 1938. Time will be devoted to a study of the effect of the program on production and prices of cotton, tobacco, wheat, corn, and hogs according to their relative importance in North Carolina. Mr. Barnes.

Agr. Econ. 333. The Agricultural Adjustment Program for 1939. 0-0-3

Prerequisite: Agr. Econ. 332. Elective for juniors and seniors in Agriculture.

A comprehensive study of the methods and routine for administration of the 1939 Agricultural Conservation Program and the crop control measures in effect for 1939. Laboratory work will include field and office work with aerial photographs and with the forms prescribed for use with the 1939 Program with a view to preparing students for work in the counties during the summer of 1939. Messrs. Barnes and Patten.

Courses for Graduates and Advanced Undergraduates

Agr. Econ. 402, 403. Farm Cost Accounting. 0-3-3

Required of seniors in Agricultural Economics. Prerequisite: Econ. 205 or 201-202-203, and 301-302-303.

The principles of accounting applied to farm transactions, the preparation of financial statements, the methods of keeping farm records, analysis of an individual farm record, and the interpretation of cost accounting results. Mr. Greene.

Agr. Econ. 411. Agricultural Marketing. 3-0-0

Required of seniors in Agricultural Economics, Agriculture, and Vocational Education. Prerequisite: Econ. 205 or 201-202-203.

The economic principles underlying successful marketing of farm products, market organization and control, price-making forces; critical examination of the present system of marketing farm products. Mr. Leager.

Agr. Econ. 421. Marketing Methods and Problems. 3-0-0

Required of seniors in Agricultural Economics.

Prerequisite: Econ. 201-202-203, Agr. Econ. 202, and 6 additional term credits in Economics.

A careful study of the problems and methods involved in the marketing of farm products. Suggestions for improvement stressed. Mr. Smith.

Agr. Econ. 422. Agricultural Coöperation. 0-3-0

Required of seniors in Agricultural Economics. Prerequisite: Econ. 205 or 201-202-203.

Specific consideration of local community coöperation, both economic and social; farmers' buying, selling, and service organizations. Mr. Clement.

Agr. Econ. 423. Farm Management II. 0-0-3

Required of seniors in Agricultural Economics. Prerequisite: Agr. Econ. 303.

Application of farm management principles to the management and organization of farms in typical regions of the State. Mr. Green, Mr. Forster.

Agr. Econ. 432. Agricultural Finance. 0-3-0

Elective. Prerequisite: Econ. 205, Agr. Econ. 202, and 6 additional term credits in Economics.

Principles involved in financing the production and marketing of agricultural products. Consideration of farm mortgage credit, personal and intermediate credit, and agricultural taxation. Mr. Forster.

Agr. Econ. 433. Land Economics. 0-0-3

Elective. Prerequisite: Econ. 201-202-203, Agr. Econ. 202, and 6 additional term credits in Economics.

The economic problems of land classification, ownership and acquisition of land, tenancy and land ownership, the functions of the landlord and the tenant, land valuation and land speculation. Mr. Forster.

Agr. Econ. 442. Cotton and Tobacco Marketing. 0-3-0

Required of seniors in Agricultural Economics. Prerequisite: Econ. 205, Agr. Econ. 202, Agr. Econ. 411, and 3 additional credits in Economics.

Problems arising in connection with the marketing of cotton and tobacco. Particular attention is given to the methods and practices used in the marketing of tobacco and cotton. Mr. Forster, Mr. Smith.

Agr. Econ. 450. Agricultural Extension Methods. 3 credits

A study of office record systems, office management, program determination, program development, reports and their use; and the obtaining, preparation, and use of material in Extension teaching.

Dean of the School of Agriculture and his staff.

Agr. Econ. 461, 462, 463. The Statistical Analysis of Agricultural Economic Data. 2-2-2

Required of seniors in Agricultural Economics. Prerequisite: Econ. 408-409.

This course is designed to give the student a working knowledge of the statistical methods and techniques which are used in the analysis of agricultural data, more particularly relationships which exist between acreage, production data, and farm prices. Messrs. Greene, Smith, Forster.

Courses for Graduates Only

Agr. Econ. 501. Economics of Agricultural Production. 3-0-0

Prerequisite: Econ. 201-202-203, Agr. Econ. 202, and 6 additional term credits in Economics.

Economic theories applicable to agricultural production. The nature and characteristics of the factors of production, the law of variable proportion, the law of diminishing return, and the theory of least cost. Mr. Forster.

Agr. Econ. 502. Farm Organization and Management. 0-3-0

Prerequisite: Econ. 205, Agr. Econ. 303, 423, 501, and 6 additional term credits in Economics.

The extension of the economic principles discussed in Agr. Econ. 501 and the application of these principles to the problems of farm organization and management. Mr. Forster.

Agr. Econ. 503. Agricultural Finance and Taxation. 0-0-3

Prerequisite: Econ. 201-202-203, Agr. Econ. 432, and 6 additional term credits in Economics.

Problems in financing agricultural production and marketing, and methods of taxation as they affect agriculture. A history of the development of financial institutions designed to serve agriculture. Mr. Leager.

Agr. Econ. 513. Coöperative Marketing Methods and Practices. 0-0-3

Prerequisite: Econ. 201-202-203, Agr. Econ. 411, and 6 additional term credits in Economics.

A critical study of the methods and practices used by large agricultural coöperatives. Mr. Clement.

Agr. Econ. 521, 522, 523. Research Method and Procedure in Agricultural Economics and Rural Sociology. 2-2-2

Prerequisite: Economics 201-202-203; 408-409, and 6 additional term credits in Economics.

A consideration of the research method and procedure now being employed by research workers in the field of Agricultural Economics, including qualitative, quantitative, inductive, and deductive methods of research procedure, choice of projects, planning, and execution of the research project.
Mr. Forster and Mr. Smith.

Agr. Econ. 532. National Economic Policies Affecting Agriculture. 0-3-0

Prerequisite: Econ. 201-202-203, Agr. Econ. 202, Agr. Econ. 411.

A critical analysis of the various farm relief proposals with special reference to those made to control production, assist in the marketing of farm products and to supply farmers with various kinds of credit. Mr. Forster.

Rural Sociology

Courses for Graduates and Advanced Undergraduates

Rural Soc. 302. Rural Sociology. 0-3-0 or 0-0-3

Prerequisites: Soc. 202, 203 or Econ. 201-202-203. Required of juniors in Rural Sociology, seniors in Agricultural Economics, and juniors in certain Education curricula.

The culture, social organization, and social problems of rural people with special reference to Southern rural life and proposed programs of development. Mr. Matthews.

Rural Soc. 403. Farmers' Movements. 0-0-3

Prerequisite: Rural Soc. 302. Required of seniors in Agricultural Economics and Rural Sociology.

The origin, growth, and the present status of such national farmers' organizations and movements as: the Grange, the Farmers' Alliance, the Populist Revolt, the Agricultural Wheel, the Farmers' Union, the Society of the Equity, the Non-Partisan League, the Farm Bureau, the Farm-Labor Union, the Coöperative Marketing Movement. Mr. Matthews.

Rural Soc. 412. Rural Social Traits and Attitudes. 0-3-0

Prerequisite: Rural Soc. 302. Required of seniors in Rural Sociology.

The characteristic social traits and attitudes of rural people in relation to rural social organizations and rural institutions. Mr. Matthews.

Rural Soc. 413. Community Organizations. 0-0-3

Prerequisite: Rural Soc. 302. Required of seniors in Rural Sociology and in Agricultural Teaching.

Community organization in North Carolina and other states. Community structure and size, community institutions and service agencies, community disorganization, methods of community organization, leadership and the relation of community organization to State and national agencies. Mr. Matthews.

Courses for Graduates Only

Rural Soc. 512, 513. Advanced Rural Sociology. 0-3-3

Prerequisites: Rural Sociology 302, and 6 additional term credits in either Rural Sociology or Agricultural Economics.

Historical forms of rural society; differentiation and mobility of farmer and peasant classes; bodily, vital, mental, and moral characteristics of rural as compared with urban groups; relation of farm people to other social groups; standards and planes of living; rural institutions and culture; national agrarian policy; and a critical review of current research in rural sociology. Mr. Matthews.

Rural Soc. 521, 522, 523. Research in Agricultural Economics and Rural Sociology. 3-3-3

Research problems in agricultural production, marketing, finance, taxation, population, community organization, family life, standards of living and social attitudes. Staff.

AGRONOMY

Agricultural Engineering, Field Crops and Plant Breeding, Soils Divisions

Professor: C. B. WILLIAMS, Head of the Department.

Agricultural Engineering Division

Professor: D. S. WEAVER, Head of the Division.
Assistant Professor: G. W. GILES.

Equipment.—The offices, classrooms, and shops used in Agricultural Engineering are in Patterson Hall and the Shops Building. The laboratories are equipped with the latest labor-saving farm equipment for seedbed preparation, planting, cultivating, harvesting, and crop preparation. These machines are furnished by the leading farm-machinery manufacturers, and are replaced from time to time as improvements are developed. Special effort is made to have on hand all types of equipment for use in the best practices in the production of farm crops.

Farm Conveniences, such as water systems for the home and the farm, individual electric-light plants, gas engines, tractors, septic tanks, are well represented.

The Farm Buildings Laboratory is equipped with drawing tables, supply cabinets, and models of various types of farm buildings construction.

Laboratory Equipment for Soil Conservation, such as that for terracing and gully control, consists of sets of surveying and leveling instruments.

Practice.—Field areas in crops, vineyards, orchards, and pastures are available for practice in the use of farm equipment, and in drainage and erosion control.

A Bulletin Library of Agricultural Engineering is maintained for student reference.

Courses for Undergraduates

Agr. Eng. 202. Farm Equipment. 0-3-0

Prerequisites: Math. 100 or Physics 115 or 201. Required of sophomores in Agriculture.

A study of modern equipment and buildings for the farm.

Mr. Weaver, Mr. Giles.

Agr. Eng. 212. Farm Engines. 0-3-0

Prerequisite: Physics 115 or 201. Required of sophomores in Agr. Eng. and juniors in Animal Production and in Dairy Manufacturing.

A study of the principles of gas engine operation and their application to farm uses. Selection, operation, and repair of engines is stressed. Mr. Giles.

Agr. Eng. 222. Agricultural Drawing. 0-3-0

Elective for juniors and seniors.

Drawing-board work covering both freehand sketching and elementary mechanical drawing. Working and pictorial drawing, lettering, maps, graphs, tracing, and blueprinting. Mr. Weaver.

Agr. Eng. 232. Farm Conveniences. 0-3-0

Prerequisites: Agr. Eng. 202. Required of juniors in Agr. Eng.

A study of farm water supply systems, electric lighting plants, heating and sewage disposal systems as regards installation, adjustment, and repair. Mr. Giles.

Courses for Advanced Undergraduates

Agr. Eng. 303. Terracing and Drainage. 0-0-3

Prerequisite: Soils 201 and Agr. Eng. 202. Required of juniors in Agr. Eng., juniors in Floriculture, Pomology and Vegetable Gardening, and of seniors in Animal Production, Poultry Science, and Farm Business.

A study of the different methods of disposing of surplus water and the prevention of erosion. Mr. Weaver, Mr. Giles.

Agr. Eng. 313. Farm Machinery and Tractors. 0-0-3

Prerequisite: Agr. Eng. 202. Required of seniors in Agr. Eng. and in Poultry Science.

A study of the design, construction and operation of modern labor-saving machinery for the farm. Mr. Giles.

Agr. Eng. 322. Farm Buildings. 0-3-0

Prerequisites: Agr. Eng. 202. Required of juniors in Agr. Eng. and seniors in Agr. Economics.

A study of the design, construction, and materials used in modern farm buildings. Mr. Weaver.

Agr. Eng. 331, 332. Teaching of Farm Shop Work. 3-3-0

Prerequisite: Agr. Eng. 202. Required of juniors in Agr. Eng. and in Vocational Agriculture.

This course is designed for men intending to teach Vocational Agriculture in the high schools of this State. Methods of presenting the subject matter to students as well as the manipulation of woodworking, forging, soldering, and pipe fitting tools. Mr. Giles.

Courses for Graduates and Advanced Undergraduates

Agr. Eng. 403. Erosion Prevention. 0-0-3

Prerequisite: Agr. Eng. 303. Required of seniors in Agr. Eng.

The purpose of this course is to go into the causes, effects, and methods of conserving our greatest national resource—our fertile soil. Mr. Weaver.

Agr. Eng. 423. Farm Structures. 0-3-0 or 0-0-3

Prerequisite: Agr. Eng. 322. Required of seniors in Agr. Eng.

An advanced study of modern building methods as applied to farm structures. The use of labor-saving barn equipment and methods of reducing labor to minimum is stressed. The placing of the farm group in relation to topography and farm activities, from the standpoint of economy, appearance, and utility, is an important phase of the course. Mr. Weaver.

Agr. Eng. 432. Rural Electrification. 0-3-0

Prerequisite: Agr. Eng. 322. Required of seniors in Agr. Eng.

A study of problems involved in the distribution, uses and costs of electricity on the farm. Mr. Weaver.

Agr. Eng. 481, 482, 483. Special Problems in Agricultural Engineering. 3-3-3

Prerequisites: Agr. Eng. 303 or 313 or 322 or 331-332. Only one term required of seniors in Agr. Eng., other two elective.

This course is designed to meet the needs of students who desire advanced work in one of the following branches of Agr. Engr., Farm Engines, Tractors, Farm Mach., Buildings, Conveniences, Rural Electrification, Erosion Control and Drainage. Mr. Weaver, Mr. Giles.

Agr. Eng. 491, 492, 493. Senior Seminar. 1-1-1

Prerequisite: Senior standing in Agr. Eng. Required of seniors in Agr. Eng.

Students will be assigned special problems the results of which are to be presented to the class. Mr. Weaver, Mr. Giles.

Field Crops and Plant Breeding Division

Professor: J. B. COTNER, Head of the Division
Instructor: J. A. RIGNEY

The offices, classrooms, and laboratories are located in Patterson Hall. The equipment for teaching Field Crops consists of standard apparatus, and official types for the study and determination of the market grades of cotton, tobacco, corn, small grains, and forage crops. Other equipment consists of a specimen garden located on the College farm, and specimens of cultivated varieties of field crops and their seeds.

F. C. 201. Cotton. 3-0-0

Required of sophomores in Textiles.

Lectures and recitations on the history, botany, and physiology of the cotton plant; comparative study of varieties; misroscopic studies of the fiber, and a study of the physical properties of the fiber as it affects milling quality.

Mr. Cotner.

Courses

F. C. 202. General Field Crops. 0-3-0 or 0-0-3

Required of sophomores in Agriculture.

A standard introductory course. Emphasis is given to the economic production of field crops as used in well-balanced cropping systems.

Mr. Cotner, Mr. Rigney.

F. C. 212. Cotton Classing I. 0-3-0

Required of sophomores in Textile Manufacturing, Chemistry and Dyeing, and Designing.

A study of the universal standards of American upland cotton for grade and staple. Factors that determine grade, and their relative value. Practice consists of classing and stapling from three to five thousand samples of cotton.

Mr. Cotner.

Courses for Advanced Undergraduates

F. C. 302. Cereal Crops. 0-4-0

Required for Field-Crop majors.

Advanced study of the various factors that should be considered in the economic production of corn and small grains. Mr. Rigney.

F. C. 312. Tobacco Production. 0-3-0

This course, or F. C. 323, required of students in General Agriculture.

Lectures and recitations on the history, production, adaptation, type, and varieties of tobacco; its cultivation, harvesting, grading, and marketing. Laboratory consists of variety studies and the grading of tobacco. Mr. Cotner.

F. C. 323. Cotton Production. 0-0-3

This course, or F. C. 312, required of students in General Agriculture.

Lectures and recitations on the history, production, adaptation, type, and varieties of cotton; its cultivation, harvesting, grading, and marketing. Laboratory consists of variety studies, and the classing of cotton lint.

Mr. Cotner.

Courses for Graduates and Advanced Undergraduates

F. C. 402. Cotton Classing II. 0-3-0

Elective for juniors or seniors.

A study of the universal standards of American upland cotton for grade and staple. Factors that determine grade and how to improve them. Practice consists of classing from three to five thousand samples of North Carolina cotton. Mr. Cotner.

F. C. 403. Legumes and Grasses. 0-0-4

Prerequisite: F. C. 202. Required of Field-Crops and Animal-Production majors.

Advanced study of legumes and grasses as to their adaptation and uses. Emphasis is placed on their economic use in crop and livestock farming.

Mr. Cotner.

F. C. 411-412-413. Advanced Cotton Classing. 3-3-3

Prerequisite: F. C. 212 or 402. For men who expect to become specialists in cotton classing.

This course will prepare men to take the U. S. Civil Service examination for cotton classing. Mr. Cotner.

F. C. 421-422-423. Advanced Cotton Production. 3-3-3

Prerequisite: F. C. 323.

Advanced study of cotton production problems. Mr. Cotner.

F. C. 431-432-433. Crop Breeding. 3-3-3

Special problems in inheritance and methods of investigation. A student may select a problem in any phase of plant breeding. Mr. Cotner.

F. C. 441. Seed Judging. 3-0-0

Advanced study of quality in crop seeds and the standards for seed certification. Arranging and judging of crop exhibits. Mr. Rigney.

F. C. 451. Market Grading of Field Crops. 3-0-0

Required of students in Animal Production.

A study and application of the Federal Standard for Market grades as applied to field crops. Mr. Rigney.

F. C. 461. Taxonomy of Field Crops. 3-0-0

A study of the origin, botanical classification, identification, and adaptation of the commercially important crops and their varieties grown in America. Mr. Rigney.

F. C. 471. Plant Breeding. 3-0-0

Prerequisite: Zoölogy 411.

Lectures, field and laboratory exercises, including methods and principles of plant breeding. Mr. Cotner.

F. C. 472. Experimental Methods. 0-3-0

A study of the development in agricultural experimental work and the experimental technique as developed to date by soil-fertility, crop and crop-breeding tests and demonstrations. Mr. .....

F. C. 481-482-483. Senior Seminar. 1-1-1

Prerequisite: Twelve credit hours in Field Crops.

Scientific articles, progress reports in research and special problems of interest to agronomists will be assigned, and reviewed with discussion by students and members of the Agronomy Staff. Mr. Cotner.

F. C. 491-492-493. Crop Research. 3-3-3

Prerequisite: Twelve credit hours in Field Crops.

A study of research and demonstration in crops. Emphasis will be placed on experimental tests in progress. Crops for special consideration will be assigned. Mr. Cotner.

Courses for Graduates Only

F. C. 501-502-503. Crop Research. 3-3-3

Prerequisite: Fifteen credit hours in Field Crops.

A study of special problems and methods of investigation. A student may select a problem in any phase of crop production. Mr. Cotner.

F. C. 511-512-513. Advanced Tobacco Production. 3-3-3

Prerequisite: F. C. 312 and ten additional credit hours in Field Crops.

Advanced study of tobacco production problems. Mr. Cotner.

F. C. 521-522-523. Seminar. 1-1-1

Prerequisite: Fifteen credit hours in Field Crops.

Scientific articles, progress reports in research, and special problems of interest to Agronomists will be assigned, reviewed, and discussed by students and members of the Agronomy Staff. Mr. Cotner.

F. C. 531-532-533. Plant Breeding Research. 3-3-3

Prerequisite: F. C. 471.

Inheritance problems of the plants. Available during any season appropriate to the study of the particular crop. Mr. Cotner.

Soils Division

Professor: C. B. CLEVENGER, Head of the Division
Associate Professor: J. F. LUTZ

The Soils Laboratories are equipped with the facilities for instruction in general and advanced work in soil management, soil fertility, fertilizers, and in soil classification and surveying. Samples of most of the North Carolina soil types as well as many samples from other States are available for study. The information on the classification, distribution, composition, crop adaptation, and fertilizer requirements of North Carolina Soils which has been accumulated by the Experiment Station affords valuable material for student use. Facilities for field and laboratory work on the physical and chemical properties, classifications, and fertility of North Carolina soils are unusually good.

Courses for Undergraduates

Soils 201. Soils. 4 or 4 or 4

Prerequisite: Geol. 120 and Chem. 101-2-3. Required of sophomores in Agriculture and Agricultural Chemistry, and of juniors in Forestry and Wildlife Conservation and Management.

A study of the properties of soils and their relation to soil management. Mr. Clevenger, Mr. Lutz.

Soils 221. Soil Fertility. 3-0-0

Prerequisite: Soils 201 and Chem. 221. Required of juniors in Pomology, Vegetable Gardening, Floriculture, Field Crops, Vocational Agriculture, and of seniors in Agricultural Engineering.

A course dealing with the chemical and biological properties of soils as related to soil productivity. Mr. Lutz.

Courses for Advanced Undergraduates

Soils 302. Fertilizers. 0-3-0

Prerequisite: Soils 201 and Chem. 221. Required of juniors in Pomology, Vegetable Gardening, Field Crops, Floriculture, and Vocational Agriculture.

Sources, manufacture, characteristics, and utilization of fertilizers; calculation of formulas and analyses. Mr. Clevenger.

Soils 312. The Soils of North Carolina. 0-3-0

Prerequisite: Soils 201. Required of juniors in Soils and Floriculture, and of seniors in Wildlife Conservation, Vegetable Gardening, and Agricultural Economics; Farm Business Option.

The origin, characteristics, and classification of North Carolina soil. Field trips. Mr. Lutz.

Soils 323. Soil Survey. 0-0-3

Prerequisites: Ten credit hours in Soils including Soils 312 or equivalent. Elective for juniors and seniors in Agriculture.

Making soil maps, and writing soil-survey reports. Mr. Clevenger.

Courses for Advanced Undergraduates and Graduates

Soils 401. Pedology. 3-0-0

Required of seniors in soils. Prerequisite: Soils 221.

Soil groups of the world, with special attention to the characteristics and plant adaptation of the soils in the United States.

Mr. Clevenger.

Soils 402. Principles and Use of Fertilizers. 0-3-0

For juniors and seniors. Prerequisite: Soils 201 for Agricultural students; and Chem. 101, 102, 103 for Non-Agricultural students.

The sources, manufacture, characteristics, and utilization of fertilizers; calculation of formulas. Mr. Clevenger.

Soils 403. Fertilizer Experimentation. 0-0-3

Prerequisite: Soils 402.

A study of the methods of determining the fertilizer needs of different soil types. Mr. Clevenger.

Soils 411, 412, 413. Soil Technology. 3-3-3

Prerequisite: Soils 221, Chem. 211-212. Required of seniors in Soils.

A laboratory course dealing with the physical and chemical properties of soils. Mr. Lutz.

Soils 421. Soil Fertility Evaluating Methods. 3-0-0

Prerequisite: Soils 402 and Chem. 215.

Analysis for total and available elements in the soil and the use of analyses in soil diagnosis. Staff.

Soils 423. Soil Management. 0-0-3

Prerequisite: Soils 402.

Rotations, fertilizer recommendations, and other practical soil management problems for North Carolina soils and cropping systems. Mr. Lutz.

Soils 432. Physical and Colloidal Properties of Soils. 0-3-0

Prerequisite: 18 credits in soils, and Chem. 215.

Base exchange, absorption phenomena and other physical and colloidal soil properties as related to soil fertility. Offered in alternate years. Offered in 1940-41. Mr. Lutz.

Soils 433. Soil Conservation and Land Use. 0-0-3

Required of seniors in Soils and in Agricultural Engineering. Prerequisite: Soils 221.

Factors affecting soil deterioration; soil conservation and land use. Mr. Lutz.

Soils 451, 452, 453. Senior Seminar. 1-1-1

For seniors in Soils. Prerequisite: 15 credits in Soils.

Reports on problems and current scientific articles dealing with soil science. Staff.

Courses for Graduates Only

Soils 501. Soil Development. 3-0-0

Prerequisite: Graduate standing in Soils.

Genesis, morphology, and development of the great soil groups of the world as determined by environmental factors. Mr. Lutz.

Soils 513. Advanced Principles and Use of Fertilizers. 0-0-3

Prerequisite: Graduate standing and Soils 402.

Advanced studies in the manufacture, characteristics, and utilization of fertilizers. Mr. Clevenger.

Soils 522. Soil Physics. 0-3-0

Prerequisite: Graduate standing in Soils.

Advanced study of soil structure, aeration, water relationships, mechanical analyses, and other physical properties of soils. Offered in alternate years: offered in 1939-1940. Mr. Lutz.

Soils 531, 532, 533. Seminar. 1-1-1

Prerequisite: Graduate standing in Soils.

Reports and discussions of problems in Soil Science. Staff.

Soils 541, 542, 543. Soil Research. 3-3-3

Prerequisite: Graduate standing in Soils.

Research in specialized phases of Soil Sciences. Staff.

ANIMAL HUSBANDRY AND DAIRYING

Professors: R. H. RUFFNER, Head of the Department; E. H. HOSTETLER, W. L. CLEVENGER.

Associate Professors: F. M. HAIG, C. D. GRINNELLS, J. E. FOSTER.
Instructor: C. D. SWAFFAR.

Curriculum.—The curriculum in Animal Husbandry and Dairying is based on thorough fundamental training in Animal Production and Dairy Manufacturing. The Department is equipped to instruct students in the profitable types of farm animals, how to handle them to get the best returns, how to select breeding stock, and how to feed all classes of farm animals. The students in this Department feed and prepare animals for the block, actually do the slaughtering, and cut the meat for market and home use.

Livestock.—The dairy barns contain more than 100 registered cattle, representing four breeds. In many ways, the herd of dairy cattle owned by the College is one of the best to be found. A sufficient number of swine, beef cattle, and sheep are kept to give the students practice in every phase of the industry.

Equipment.—The dairy is especially well equipped with modern machinery to give instruction in testing milk and its products, in creamery-butter and ice-cream making, and in handling market milk. There is adequate refrigerating equipment for cold storage of meats as well as dairy products.

Positions.—Well-trained young men in the various fields of Animal Husbandry and Dairying have greater opportunities for service to the State than ever before. Some of the responsible positions held by graduates in Animal Husbandry and Dairying are as: county agents; livestock and dairy farmers; State and Federal agricultural workers; superintendents of dairy manufacturing plants; college agricultural teachers; managers and salesmen in commercial livestock companies; managers of livestock and dairy farms; milk and food inspectors; supervisors of herd-improvement associations.

Course for Undergraduates

A. H. 202. Animal Nutrition I. 0-3-0 or 0-0-3

Required of sophomores in Agriculture. Prerequisite: Chem. 101-102-103.

A study of animal nutrition; composition of animal body; digestion; nutrients; feeding standards; calculating rations. Mr. Ruffner, Mr. Haig.

Courses for Advanced Undergraduates

A. H. 301. Farm Meats I. 3-0-0 or 0-3-0 or 0-0-3

Elective for juniors and seniors in Agriculture. Req.: juniors A. H. and seniors in Pomology and Poultry Science.

A study of the composition and value of meat, with practice work in slaughtering and cutting. Mr. Swaffar.

A. H. 302. Farm Meats II. 0-3-0

Elective for juniors and seniors in Agriculture. Prerequisite: A.H. 301.

Special study and practice in making retail cuts and in curing pork, beef, and lamb. Mr. Swaffar.

A. H. 303. Advanced Stock Judging. 0-0-3

Elective for juniors and seniors in Agriculture.

A study of market and show-ring requirements in the selection of horses and mules, beef cattle, dairy cattle, sheep, and swine. Breed characteristics of these animals are studied in detail, and practice judging brings out the relationship of form to function in livestock production. Mr. Haig, Mr. Swaffar.

A. H. 311. Comparative Anatomy and Physiology of Domestic Animals. 3-0-0

Prerequisite: Zool. 102. Elective for juniors and seniors in Agriculture.

A course dealing with the structure and functions of the animal body. Laboratory, lectures, and recitations. Mr. Grinnells.

A. H. 313. Sheep Production. 0-0-3

Elective for juniors and seniors in Agriculture. Required of seniors in Animal Husbandry.

A study of the establishment, care, and management of the farm flock. Mr. Foster.

A. H. 321. Dairy Cattle and Milk Production. 3-0-0

Elective for juniors and seniors in Agriculture. Required of seniors in Poultry Science and Agricultural Engineering.

A study of management of dairy cattle for economical milk production, including dairy breed characteristics, adaption, selection, management, feeding, calf raising and dairy barn equipment. Mr. Haig.

A. H. 322-323. History of Breeds. 0-3-3

Required of juniors in Animal Prod. Elective for juniors and seniors in Agriculture.

A study of types, characteristics, and history of the leading strains and families of the different breeds of animals. Mr. Ruffner, Mr. Haig, Mr. Swaffar.

A. H. 331. Swine Production. 3-0-0

Required of juniors in Animal Production and seniors in Poultry Science. Elective for juniors and seniors in Agriculture.

A study of adaptability of swine, with emphasis on feeding, judging, and management. Mr. Hostetler.

A. H. 332. Testing of Milk Products. 0-4-0

Elective for juniors and seniors in Agriculture. Required of seniors in Animal Husbandry and juniors in Dairy Manufacturing.

Lectures and laboratory practice on the testing of milk and milk products for butterfat, acidity, adulteration, preservatives, sediment, etc., that are ordinarily used by dairy manufacturing plants or in milk inspection work. Mr. Clevenger.

A. H. 333. Cheesemaking. 0-0-3

Elective for juniors and seniors in Agriculture. Required of juniors in Dairy Manufacturing.

Lectures and laboratory practice in making various soft and hard cheeses usually made on a farm or in a cheese factory. Mr. Clevenger.

A. H. 341. Dairying. 3-0-0 or 0-3-0

Required of juniors in Animal Prod. and seniors in Vegetable Gardening. Elective for students in Agriculture.

Fundamentals of dairy herd management in the production of milk and cream on the farm. The use of the Babcock Tests, buttermaking on the farm, operation of cream separators, constitute the laboratory work. Mr. Haig.

A. H. 342. Dairy Manufacture Practice. 0-3-0

Elective for juniors and seniors in Agriculture. Required of juniors in Dairy Manufacturing.

Lectures and laboratory practice on the business and factory management methods used in dairy plants. Mr. Clevenger.

A. H. 343. City Milk Supply. 0-0-4

Elective for juniors and seniors in Agriculture. Required of juniors in Dairy Manufacturing.

Lectures and laboratory practice; the phases of the city milk supply from the standpoint of the Milk Inspector and Board of Health; the methods and processes used in a central pasteurizing milk distribution plant and the dairymen supplying milk to same; the raw retail milk distributor and his problems. Mr. Clevenger.

A. H. 351. Horse and Mule Production. 3-0-0

Elective for juniors and seniors in Agriculture.

A study of practical methods in production and management of horses and mules for work on farms under southern conditions. Special study of home-grown feeds for horses and mules at work or idle. Mr. Haig.

A. H. 352. Common Diseases. 0-3-0

Elective for juniors and seniors in Agriculture.

A study of contagious, non-contagious, and parasitic diseases of farm animals. Laboratory, lectures, recitations. Mr. Grinnells.

A. H. 353. Animal Hygiene and Sanitation. 0-0-3

Prerequisite: Bot. 402. Elective for juniors and seniors in Agriculture. Required of juniors in A. H. and of senior Teachers of Agriculture.

Animal health and prevention of disease as affected by environment. Lectures, reference reading, recitations. Mr. Grinnells.

A. H. 361. Animal Nutrition II. 3-0-0 or 0-0-3

Required of juniors in Animal Prod. Elective for juniors and seniors in Agriculture. Prerequisite: A. H. 202.

A study of all feeding stuffs used in America; laws controlling feeding stuffs; preparation of feeds; home mixed and commercial feeds.

Mr. Ruffner, Mr. Haig.

A. H. 362. Dairy Machinery. 0-1-0

Elective for juniors and seniors in Agriculture. Required of seniors in Dairy Manufacturing and Agr. Engineering.

Lecture and demonstration on the installation, kind, care, and handling of dairy plant equipment, including the refrigerating unit, pipe fitting, soldering, etc. Mr. Clevenger.

A. H. 371. Creamery Buttermaking. 4-0-0

Elective for juniors and seniors in Agriculture. Required of juniors in Dairy Manufacturing.

This course deals with the principles and practices of factory buttermaking, from the care of the cream on the farm through the different processes until ready for marketing. Mr. Clevenger.

A. H. 372. Beef Cattle Production. 0-3-0

Elective for juniors and seniors in Agriculture. Required of seniors in Animal Husbandry.

A study of the feeding, care, and adaption of beef cattle to North Carolina conditions. Mr. Foster.

A. H. 381. Ice Cream Making. 4-0-0

Elective for juniors and seniors in Agriculture. Required of juniors in Dairy Manufacturing.

Standardizing of mixing and freezing of ice cream, sherbets, and other frozen products, and the physical principles involved; types of freezers, flavoring materials, fillers and binders; ice cream standards. Theory and practice of refrigeration; its use in the ice-cream plant. Mr. Clevenger.

A. H. 391, 392, 393. Senior Seminar. 1-1-1

Required of seniors in A. H. Prerequisite: A. H. 202.

A discussion of livestock problems by extension and research workers, together with special assignments to students with regard to various phases of the industry. Animal Husbandry Staff.

A. H. 394. Dairy Products Judging. 0-0-1

Elective for juniors and seniors in Agriculture. Required of seniors in Dairy Manufacturing.

A course of training for students in judging all dairy products according to official standards and commercial grades. Mr. Clevenger.

A. H. 395. Summer Practicum. 3 credits

Required of all students in Animal Production and Dairy Manufacturing. Prerequisites: 18 credits in Animal Husbandry.

This course requires a minimum of six weeks practical work on an approved livestock farm or in a creamery, for which remuneration may be obtained. If the work is done at the College farms or College Creamery, no remuneration other than specified credit will be allowed. Each student will be required to submit an outline of his proposed work during the spring term and a final report of the work done during the fall term. Staff.

Courses for Graduates and Advanced Undergraduates

A. H. 401, 402, 403. Dairy Manufactures. 3-3-3

Required of seniors in Dairy Manufacturing. Prerequisite: A. H. 202 and 12 hours of the dairy manufacturing courses.

Special problems dealing with the manufacture and marketing of dairy products. Mr. Clevenger.

A. H. 412. Animal Nutrition III. 0-3-0

Elective for seniors in Agriculture. Prerequisite: A. H. 202, A. H. 361.

A study of the chemistry and physiology of nutrition and the processes of animal life; recent scientific publications are studied. Mr. Ruffner.

A. H. 413. Herd Improvement. 0-0-3

Prerequisite: A. H. 202, 341, 361. Elective for juniors and seniors in Agriculture. Required of juniors in A. H.

This course is designed for training students as supervisors of Herd Improvement Associations in North Carolina. Rules for Advanced Registry are studied, and practical work in keeping feed costs, the Babcock Test, and bookkeeping necessary for dairy associations. Mr. Haig.

A. H. 421. Animal Breeding. 4-0-0

Elective for juniors and seniors in Agriculture. Required of seniors in Animal Husbandry.

A study of breeding and improvement of our domestic animals; a first-hand study of successful breeding establishments and their problems. Mr. Ruffner.

A. H. 432. Pure-bred Livestock Production. 0-3-0

Elective for seniors in Agriculture. Required of seniors in Animal Husbandry. Prerequisite: A. H. 202, 331.

A study of the pure-bred livestock industry. Lectures and discussion supplemented by assignments from current periodicals and breed papers. Special study of the selection of livestock best suited to different localities.

Mr. Ruffner.

A. H. 433. Stock Farm Management. 0-0-3

Prerequisite: A. H. 202. Elective for juniors and seniors in Agriculture. Required of seniors in Animal Husbandry.

A study of successful methods of operating farms devoted chiefly to livestock production; special reference is made to best systems applied to North Carolina conditions. Mr. Ruffner.

A. H. 441, 442, 443. Problems in Advanced Animal Breeding. 3-0-0, 0-3-0, 0-0-3

Prerequisite: A. H. 421. Elective for seniors in Agriculture.

A study of the physiology of reproduction. Methods and problems of breeders; influence of pedigree, herd books, and Mendelism in animal breeding. Mr. Ruffner.

Courses for Graduates Only

A. H. 501, 502, 503. Research Studies in Animal Husbandry. 3-0-0 or 0-3-0 or 0-0-3

Prerequisite: Eighteen credits in Animal Husbandry.

An intensive study of experimental data. Staff.

A. H. 511, 512, 513. Advanced Nutrition. 3-0-0, 0-3-0, 0-0-3

Prerequisite: A. H. 202, 361.

A survey of experimental feeding, together with a study of the fundamental and practical feeding problems of the various sections of the country. A study is made of the effects of various feeds on growth and development. Animals are used in demonstrating the effects of these various nutrients and rations. Mr. Ruffner.

A. H. 521, 522, 523. Special Problems in Dairy Manufacturing Practice. 3-3-3

Prerequisite: Eighteen term credits in Dairy Manufacturing.

Available for graduate students interested in special dairy manufacturing problems under definite supervision and approval. Mr. Clevenger.

A. H. 531, 532, 533. Seminar. 1-1-1

Members of the seminar will be assigned subjects which will be reviewed and discussed. Review of literature, scientific reports and Experiment Station bulletins. Oral and written reports. Staff in A. H.

ARCHITECTURAL ENGINEERING

Courses for Undergraduates

Arch. 100. Pencil Sketching. 3-0-0, 0-3-0, 0-0-3

Required of seniors in L. A.; elective for Engineering and Textile students.

Quick sketching of objects as seen and imagined in perspective. Elementary principle of perspective, especially as applied to the visualization of imagined objects. *Mimeographed Notes and Problem Sheets.* Mr. Paulson.

Arch. 101. Freehand Drawing I, Pen and Pencil Drawing. 2-0-0

Required of juniors in Arch. and L. A.

Sketching in pencil and pen and ink from models, cast, and nature. Emphasis on quality of line and proportion. Lettering. Watson, *Pencil Sketching.* Mr. Edwards.

Arch. 102. Freehand Drawing II, Water Color. 0-2-0

Required of juniors in Arch.

The drawing and rendering in water color of subjects in architecture and nature. The development of good technique. Guptill, *Reference to Color.* Mr. Edwards.

Arch. 103. Freehand Drawing III. Charcoal Drawing. 0-0-2

Required of juniors in Arch and L. A.

Charcoal drawing from simple architectural casts and models. Edwards, *Problem Sheets.* Mr. Edwards.

Arch. 104. Art Appreciation for Teachers. 0-0-3

Picture study of the list suggested by the State Board of Education for grade-school use, including paintings, architecture, and sculpture. Paulson, *Art Appreciation for Teachers.* Mr. Paulson.

Arch. 105. Art Principles in Industry. 3-0-0

Elective for Engineering and Textile students.

Line, form, color and æsthetic principles of practical art applicable to the design of articles for manufacture. *Mimeographed Notes.* Mr. Paulson.

Arch. 106. Decorative Drawing. 3-0-0, 0-3-0, 0-0-3

Required of juniors in the Textile School.

Freehand drawing and creative designing of decorative motives adaptable to weaving and cloth printing. *Mimeographed Problem Sheets.* Mr. Paulson.

Arch. 111. Appreciation of Fine Arts, Architecture. 3-0-0

Arch. 112. Appreciation of Fine Arts, Painting. 0-3-0

Arch. 113. Appreciation of Fine Arts, Sculpture and Minor Arts. 0-0-3

Elective for students of junior standing.

Principles of art. Study of those qualities which constitute great art. First term, architecture; second term, painting; third term, sculpture and the minor arts. Reinach, *Apollo; University Prints; Mimeographed Notes.*

Mr. Paulson.

Courses for Advanced Undergraduates

Arch. 201. Elements of Architecture I. 3-0-0

Arch. 202. Elements of Architecture II. 0-3-0

Arch. 203. Elements of Architecture III. 0-0-3

Required of sophomores in Arch. and L. A. Prerequisite: M. E. 105, 106.

Exercises and studies of architectural elements and details, walls, openings, etc. A study of the orders of Architecture and their application to simple problems in composition and design. Turner, *Fundamentals of Architectural Design;* Ramsey and Sleeper, *Graphic Standards.*

Mr. Shumaker, Mr. Edwards, Mr.

Arch. 204. Elementary Rendering. 1-0-0

Required of sophomores in Arch. and juniors in L. A.

The use of various media with special regard for the technique useful for architectural rendering. Paulson, *Problem Sheets.* Mr. Edwards.

Arch. 205. Shades and Shadows. 2-0-0

Required of sophomores in Arch. and juniors in L. A. Prerequisite: M. E. 107.

The determination of conventional shades and shadows as they occur on rendered drawings. Buck, Ronan and Oman, *Shades and Shadows.*

Mr. Shumaker, Mr.

Arch. 206. Perspective Drawing. 0-2-0

Required of juniors in Arch. and L. A. Prerequisite: M. E. 107.

Study of the theory of perspective with special applications to illustration and design. Lectures and drawing. Turner, *Fundamentals of Architectural Design.* Mr. Shumaker, Mr.

Arch. 207. Historic Motives in Textiles. 3-0-0

Elective for students of junior standing.

Chronologic development of ornament motives, and the adaptation of historic motives to modern textile design. Hamlin, *History of Ornament.*

Mr. Paulson.

Arch. 301. Architectural Design B-1. 3-0-0

Arch. 302. Architectural Design B-2. 0-3-0

Arch. 303. Architectural Design B-3. 0-0-3

Required of juniors in Arch. Prerequisite: Arch. 201, 202, 203.

Problems in elementary composition, design, planning and rendering. Library research. Registration with the Beaux-Arts Institute of Design may be required. *Beaux-Arts Institute Problems.*

Mr. Shumaker, Mr. Edwards, Mr.

Arch. 304. Practical Photography. 0-0-1

Required of juniors in Arch.

The practical use of photography as an aid in architectural rendition. *Lectures, Notes,* and *Assignments.* Mr. Paulson.

Arch. 305. Architectural Details. 0-0-2

Required of juniors in Arch. Prerequisite: Arch. 201, 202, 203.

The preparation of working drawings of sections and details of construction. Ramsey and Sleeper, *Graphic Standards;* Knoblock, *Good Practice in Construction.* Mr. Shumaker, Mr. Edwards, Mr.

Arch. 306. Architectural Drawing. 0-0-3

Required of seniors in Constr. Engr. Prerequisite: C. E. 311.

Introduction to methods generally employed in architectural offices. Lectures and drawing. Purpose: to give the student sufficient training that he may read and interpret working drawings. Ramsey and Sleeper, *Graphic Standards; N. C. State Building Code.* Mr. Edwards, Mr.

Arch. 311. Advanced Rendering. 1-0-0

Arch. 312. Advanced Rendering 0-1-0

Arch. 313. Advanced Rendering. 0-0-1

Required of seniors in Arch. Prerequisite: Arch 204.

Study of different methods of presentation. Problems in rendering various types of composition and media; water color, tempera, pastels, charcoal, pencil, pen, and ink. *Problem Sheets.* Mr. Edwards, Mr.

Arch. 321. History of Architecture I . 3-0-0

Arch. 322. History of Architecture 0-3-0

Required of juniors in Arch. and L. A. Prerequisite: Arch. 201, 202, 203.

Origin and development of the historic styles of Architecture, from antiquity to modern times. Lectures. Library research with sketches. Fletcher, *History of Architecture;* Hamlin, *History of Architecture.* Mr. Shumaker.

Arch. 401. Architectural Design A-I. 3-0-0

Arch. 402. Architectural Design A-II. 0-3-0

Arch. 403. Architectural Design A-III. 0-0-3

Required of seniors in Arch. Prerequisite: Arch. 301, 302, 303.

Major problems in advanced planning and research. Registration with the Beaux-Arts Institute of Design may be required. *Beaux-Arts Institute Problems.* Mr. Shumaker, Mr. Edwards, Mr.

Arch. 404. History of Ornament. 0-0-3

Required of juniors in Arch. Prerequisite: Arch. 321, 322.

Analysis and development of the historic styles of ornament. Hamlin, *History of Ornament.* Mr. Shumaker, Mr. Paulson.

Arch. 405. History of the Decorative Arts. 0-3-0

Elective for students of junior standing. Prerequisite: Arch. 321, or 322.

Lectures and library research on the history of the decorative arts, including interior architecture, furniture, stained glass, etc. McClure, E., *Period Furniture.* Mr. Shumaker.

Arch. 406. Domestic Architecture. 0-2-0

Required of seniors in Arch. Prerequisite: Arch. 305.

Planning and designing of residences. Construction, orientation, equipment, and finishing. *Problem Sheets.*

Mr. Shumaker, Mr. Edwards, Mr.

Arch. 407. Architectural composition. 2-0-0

Required of seniors in Arch. Prerequisite: Arch. 321, 322.

Principles of planning and composition as related to buildings. Architectural motives, group planning. Library research and sketches. Curtis, *Architectural Composition.* Mr. Shumaker, Mr.

Arch. 408. Architectural Estimates. 0-0-2

Required of seniors in Arch. Prerequisite: Arch 305.

Lectures and problems in taking off quantities and in estimating materials and labor cost in building construction. *Mimeographed Notes.*

Mr. Shumaker, Mr.

Arch. 409. Building Materials I. 0-3-0

Arch 410. Building Materials II. 0-0-3

Elective for students of junior standing.

A study of all forms of building materials and methods of application in modern structures, both interior and exterior. *Manufacturers' Data Sheets.*

Mr. Edwards.

Arch. 411. Architectural Office Practice 2-0-0

Arch. 412. Architectural Office Practice. 0-2-0

Arch. 413. Architectural Office Practice. 0-0-2

Required of seniors in Arch. Prerequisite: Arch. 305.

The preparation of working drawings from sketches, following office routine. Knoblock, *Good Practice in Construction;* Ramsey and Sleeper, *Graphic Standards.* Mr. Shumaker, Mr. Edwards, Mr.

Arch. 501. Graduate Design I. 4-0-0

Arch. 502. Graduate Design II. 0-4-0

Arch. 503. Graduate Design III. 0-0-4

Prerequisite: Arch. 204, 401, 402, 403.

Class A.—Project. Advanced problems in design. Archaeology. Measured Drawings. Registration with the Beaux-Arts Institute of Design is required. *Beaux-Arts Institute Problems.* Mr. Shumaker, Mr. Edwards, Mr.

Arch. 511. Historic Research I. 4-0-0

Arch. 512. Historic Research II. 0-4-0

Arch. 513. Historic Research III. 0-0-4

Prerequisite: Arch. 401, 402, 403, 221, 222.

Research in Architecture and Art in some important phase of its development. Library work with sketches. *Library References.*

Mr. Paulson, Mr. Edwards, Mr.

BOTANY

Professors: B. W. WELLS, *Head of the Department*
S. G. LEHMAN
R. F. POOLE
D. B. ANDERSON
Associate Professor: I. V. D. SHUNK
Assistant Professor: L. A. WHITFORD
Instructor: M. F. BUELL

Equipment and Facilities

Location.—The Department of Botany occupies the second floor of Patterson Hall and the east end of the basement floor, where an adjoining greenhouse is available for the work in plant physiology.

Laboratories.—The laboratories are all equipped with projection lanterns. A well-organized herbarium supports the work in systematic botany and dendrology.

Purpose.—The Department emphasizes those phases of plant science which are foundational for the work in Agriculture and Forestry.

Courses for Undergraduates

Bot. 101, 102. General Botany. 4-4-0

Repuired of freshmen and sophomores in Agriculture.

The first term deals with the nature of the higher (crop type) plants; the second involves a survey of the major lower plant groups with the emphasis upon the economic forms (bacteria and fungi).

Mr. Wells, Mr. Shunk, Mr. Anderson, Mr. Whitford, Mr. Buell.

Bot. 202. Rural Sanitation. 0-3-0

A combination course on the relation of bacteria and insects to rural public health; meat and other food, and water inspection; health laws.

Mr. Shunk, Mr. Grinnells, Mr. Weaver.

Bot. 203. Systematic Botany. 0-0-3

Elective in Agriculture and Science. Prerequisite: Bot. 101, 102.

An introduction to the local flora and the classification of the plants included therein. Mr. Wells, Mr. Shunk, Mr. Whitford, Mr. Buell.

Bot. 211-213. Dendrology. 3-0-3

Required of sophomores in Forestry. Prerequisite: Bot. 101, 102, 203.

A study of the principal trees of North America. Mr. Buell.

Bot. 221. Plant Physiology. 5-0-0 or 0-0-5

Required of sophomores in Forestry. Prerequisite: Bot. 101, 102.

A study of the activities of living plants with special emphasis upon the fundamental principles concerned. Mr. Anderson.

Courses for Advanced Undergraduates

Bot. 301. Diseases of Field Crops. 3-0-0

Elective for juniors and seniors. Prerequisite: Bot. 101, 102, 221.

A study of the more important diseases of field crops, such as cotton, tobacco, corn, small grains, legumes, and grasses. Emphasis is placed on symptoms, cause, and control. Mr. Lehman.

Bot. 303. Diseases of Fruit and Vegetable Crops. 0-0-3

Elective for juniors and seniors. Prerequisite: Bot. 101, 102, 221.

Lectures and laboratory studies of importance, causes, symptoms, and control of diseases affecting these crops. Mr. Poole.

Bot. 311. Diseases of Forest Trees. 3-0-0

Required of seniors in Forestry. Prerequisite: Bot. 101, 102, 221.

Lectures and laboratory studies of importance, causes, symptoms, and control of diseases affecting trees and their products. Mr. Poole.

Bot. 401. Advanced Plant Pathology. 5 or 5 or 5

Elective. Prerequisite: Bot. 101, 102, 221, 301, 303.

A course designed to give the student training in those methods of investigation which are most useful in the study of plant pathological problems. Mr. Lehman.

Bot. 402. General Bacteriology. 0-4-0

Prerequisite: Bot. 101, 102, or Zool. 101.

Required of juniors or seniors in Agriculture.

An introduction to the principles of bacteriology. Laboratory work on modern cultural methods of handling and studying bacteria. Mr. Shunk.

Bot. 411-412. Plant Morphology. 3-3-0

Elective in Agriculture and Forestry. Prerequisite: Bot. 101, 102, 203.

An advanced survey of plants; the lower groups are given the first term, the higher (land plants) the second. Mr. Wells, Mr. Shunk.

Bot. 421, 422, 423. Mycology. 3-3-3

Prerequisite: Bot. 101, 102.

A course on the structure, identification, and classification of fungi. Special attention is given to species parasitic on crop plants.

Mr. Lehman.

Bot. 432. Advanced Plant Physiology. 0-3-0

Prerequisite: Bot. 101, 102, 221.

A critical and comprehensive treatment of the various aspects of plant physiology. Particular attention is given to basic principles and to recent developments. Mr. Anderson.

Bot. 441. Plant Ecology. 3-0-0

Required of juniors in Forestry. Prerequisite: Bot. 101, 102, 221.

Environmental control of plant distribution with emphasis upon the habitats and vegetation of North Carolina. Mr. Wells, Mr. Shunk.

Bot. 442. Microanalysis of Plant Tissue. 0-3-0

Prerequisite: Bot. 101, 102, 21.

The identification in plant tissues of mineral elements and organic compounds, the physiological significance of these materials. Mr. Anderson.

Bot. 443. Soil Microbiology. 0-0-3

Elective in Agriculture and Forestry. Prerequisite: Bot. 101, 102, 221, 402.

A study of the more important microbiological processes that occur in soils: decomposition of organic materials, ammonification, nitrification, and nitrogen fixation. Mr. Shunk.

Bot. 451. Plant Microtechnique. 3-0-0

Elective in Agriculture and Forestry. Prerequisite: Bot. 101, 102.

Materials and processes involved in the preparation of plant structures for microscopic examination. Mr. Anderson.

Bot. 452. Advanced Bacteriology. 0-3-0

Prerequisite: Bot. 101, 102, 221, 402.

A study of the methods used in the bacteriological analysis of water and milk. Mr. Shunk.

Bot. 453. Advanced Plant Ecology. 0-0-3

Elective in Agriculture and Forestry. Prerequisite: Bot. 221, 441.

Practice in the use of the instruments necessary in the study of environmental factors. Advanced readings and conferences on plant distribution in relation to these factors.

Bot. 463. Advanced Systematic Botany. 0-0-3

Prerequisite: Bot. 101, 102, 203.

A continuation of the elementary course 203 in the identification of the local flora plants together with a survey of the plant families from the modern phylogenetic point of view. Mr. Wells, Mr. Buell.

Bot. 473. Aquatic Biology. 0-0-2

Required of Sanitary Engineers. Prerequisite: Bot. 101, 102.

Identification and control of the aquatic algae and protozoa which give trouble in reservoirs. A survey of the higher water and marsh plants is also included. Mr. Whitford.

Courses for Graduates Only

Bot. 501, 502, 503. Pathology of Special Crops. 3-3-3

Prerequisite: Bot. 301 or 401, 402.

A comprehensive study of the etiology, symptoms, and control of specific diseases. Mr. Lehman or Mr. Poole.

Bot. 511, 512, 513. Bacteriology: Special Studies. 3-3-3

Prerequisite: Bot. 402, 452.

Special work on restricted groups of bacteria, such as nitrogen bacteria of the soil, milk organisms, and special groups of bacteria in water.
Mr. Shunk.

Bot. 521. Advanced Systematic Botany. 3-0-0 or 0-0-3

Prerequisite: Bot. 203, 411, 412.

An advanced survey of restricted groups of plants involving organization and distribution problems. Mr. Wells, Mr. Buell.

Bot. 531, 532, 533. Plant Physiology. 3-3-3

Prerequisite: Bot. 221, 432.

Critical study of some particular problem, involving original investigation together with a survey of pertinent literature. Mr. Anderson.

Bot. 541. Plant Ecology. 3-0-0 or 0-0-3

Prerequisite: Bot. 203, 441.

Minor investigations in vegetation-habitat problems accompanied by advanced reference reading. Mr. Wells.

Bot. 551, 552, 553. Research in Botany. 3-3-3

Prerequisite: 30 hours in 100-300 courses in Botany. Staff.

Bot. 561, 562, 563. Seminar. 1-1-1

Attendance by the student upon the weekly seminar toegther with the presentation of a paper in his major field of research. Mr. Wells.

CERAMIC ENGINEERING

Courses for Undergraduates

Cer. E. 102. Ceramic Materials. 0-3-0

Required of sophomores in Ceramic Engineering. Prerequisite: Geol. 220. The origin and occurrence of ceramic raw materials, their chemical and physical properties and system of measuring them. Ries, *Clays, Occurrence Properties and Uses.* Mr. Stone.

Cer. E. 103. Ceramic and Mining Processes. 0-0-3

Required of sophomores in Cer. E. and Geol. E. Prerequisite: Geol. 220. The winning and preparation of ceramic materials and the equipment and processes used in manufacturing ceramic products. Garve, *Factory Design and Equipment.* Mr. Greaves-Walker.

Courses for Advanced Undergraduates

Cer. E. 201. Drying Fundamentals and Practice. 3-0-0

Required of juniors in Cer. E. Prerequisite: Cer. E. 102. The theory and practice of drying ceramic products. Problems. Greaves-Walker, *Drying Ceramic Products.* Mr. Greaves-Walker.

Cer. E. 203. Ceramic Products. 0-0-3

Required of juniors in Cer. E. Prerequisite: Cer. E. 103. A study of the physical, chemical, and artistic requirement of ceramic products. Laboratory practice. Mr. Greaves-Walker, Mr. Stone.

Cer. E. 252. Firing Fundamentals and Practice. 0-3-0

Required of juniors in Cer. E. Prerequisite: Cer. E. 102 and 201. The theory and practice of firing ceramic products. Problems. Wilson, *Ceramics, Clay Technology.* Mr. Greaves-Walker.

Cer. E. 253. Ceramic Calculations. 0-0-3

Required of juniors in Cer. E. Prerequisite: Chem. 212, Cer. E. 102, 201 252. Solution of chemical and physical problems of the ceramic industries. Andrews, *Ceramic Tests and Calculations.* Mr. Stone.

Cer. E. 301. Silicate Bodies and Glasses. 3-0-0

Required of seniors in Cer. E. Prerequisite: Chem. 231, Cer. E. 253, and Geol. 338.

Lectures on composition and production of ceramic bodies, glazes, glasses, and colors. Problems. Greaves-Walker and Wills, *Bodies, Glazes and Colors.*

Mr. Stone.

Cer. E. 302. Metal Enamels. 0-3-0

Required of seniors in Cer. E. Prerequisite: Chem. 212, Cer. E. 253.

Theory and practice of the application of enamels to metals. Andrews, *Enamels.*

Mr. Stone.

Cer. E. 305. Pyrometry. 1-0-0

Required of seniors in Cer. E. Prerequisite: Cer. E. 252.

The theory and use of temperature measuring instruments in industry. Wood and Cork, *Pyrometry.*

Mr. Stone.

Cer. E. 311, 312, 313. Ceramic Laboratory. 3-3-3

Required of seniors in Cer. E. Prerequisite: Cer. E. 201, 203, 252, 253, 301.

Advanced practice in producing and determining the chemical and physical properties of ceramic materials and products.

Mr. Greaves-Walker and Mr. Stone.

Cer. E. 314, 315. Ceramic Designing. 0-4-4

Required of seniors in Cer. E. Prerequisite: M. E. 212, Cer. E. 103, 201, 252, and 253.

Designing of ceramic equipment and structures. Garve, *Factory Design and Equipment.*

Mr. Greaves-Walker.

Courses for Graduates and Advanced Undergraduates

Cer. E. 403. Refractories. 0-0-3

Required of seniors in Cer. E. and Geol. E. Prerequisite: Chem. 212, Geol. 338, Cer. E. 102.

Refractory materials and manufacture of refractory products.

Use of refractory products in industrial furnaces. Norton, *Refractories.*

Mr. Greaves-Walker.

Courses for Graduates Only

Cer. E. 501, 502, 503. Designing of Ceramic Equipment and Plants. 3-3-3

Prerequisite: Cer. E. 315.

Advanced study and designing of ceramic machinery, dryers, kilns, and plant structures.

Mr. Greaves-Walker.

Cer. E. 505, 506, 507. Advanced Refractories and Furnaces. 3-3-3

Prerequisite: Cer. E. 313, 403.

Advanced study of refractory materials and products and their use.

Mr. Greaves-Walker.

Cer. E. 509, 510, 511. Industrial Adaptability of Ceramic Materials. 3-3-3

Prerequisite: Cer. E. 313.

Laboratory investigations to determine the industrial uses to which various North Carolina ceramic materials can be put.

Mr. Greaves-Walker, Mr. Stone.

Cer. E. 513, 514, 515. Ceramic Research. 3-3-3

Prerequisite: Cer. E. 313.

Research problems in ceramics will be assigned to meet the desire of the student for specialization. Mr. Greaves-Walker, Mr. Stone.

Cer. E. 517, 518, 519. Glass Technology. 3-3-3

Prerequisite: Chem. 231, Geol. 338, Cer. E. 253, 302, 403.

Advanced study of the manufacture and physical properties of glass.

Mr. Greaves-Walker.

Cer. E. 521, 522, 523. Advanced Silicate Technology. 3-3-3

Prerequisite: Cer. E. 301.

Advanced laboratory practice in bodies, glazes, glasses, and colors.

Mr. Stone.

CHEMICAL ENGINEERING

Courses for Undergraduates

Chem. E. 201, 202, 203. Introduction to Chemical Engineering. 1-1-1

Required of sophomores in Chem. E. Prerequisite or concurrent: Math. 201, M. E. 105, M. E. 123.

Reactions in chemical processes, illustrative problems, and control methods; elements of unit processes and unit operation; plant visits. Randolph, *Introduction to Chemical Engineering* Mr. Randolph, Mr. Johnson.

Chem. E. 212, 213. Chemical Nature of Engineering Materials. 0-3-3

Required of Seniors in General Engineering; elective for others. Prerequisite: Chem. 101, 103, 105; Math. 103.

Study of the fundamental facts about the chemical nature of engineering materials as an aid in the proper choice of materials for various types of engineering purposes under working conditions. Teachers' Manual.

Mr. Randolph, Mr. Johnson.

Courses for Advanced Undergraduates

Chem. E. 311, 312, 313. Chemical Engineering I. 3-3-3

Required of juniors in Chem. E. and of seniors in Textile Chemistry and Dyeing. Prerequisite: Chem. E. 201 or Tex. 212.

Unit processes, inorganic and organic technology; industrial chemistry; equipment, materials, methods, and processes employed in chemical manufacture; water, fuels, and power, studied on the quantitative and mathematical basis; conversion of raw materials into such necessary products as sugar, paper, gas, paint, leather, glass; by-products and waste products. Riegel, *Industrial Chemistry*, and *Library References*. Mr. Lauer, Mr. Johnson.

Chem. E. 321, 322, 323. Chemical Engineering Laboratory I. 1-1-1

Required of juniors in Chem. E. Prerequisite or concurrent: Chem. E. 311.

A laboratory study of industrial control methods; industrial plant visits; problems and processes solved and presented in technical reports; preparation of products on pilot plant scale; costs studies. *Notes*.

Mr. Lauer, Mr. Johnson, Mr. Harris.

Chem. E. 308. Treatment of Water and Sewage. 3-0-0 or 0-0-3

Required of juniors in San. E. Prerequisite: Ch. E. 311 or C. E. 215.

Principles involved in the control of municipal water supplies and in sewage treatment; reactions involved; chemical nature of water and sewage treatment; methods for removal of the more objectionable materials in industrial waters. *Notes*. Mr. Randolph, Mr. Van Note.

Chem. E. 310. Industrial Stoichiometry. 3-0-0 or 0-3-0 or 0-0-3

Required of juniors in Chemical Engineering. Prerequisite or concurrent: Chem. E. 311.

Industrial calculations and measurements; heat balances; material balances; fuels and combustion processes; principles of chemical engineering calculations. Lewis and Radasch, *Industrial Stoichiometry*. Mr. Lauer.

Courses for Graduates and Advanced Undergraduates

Chem. E. 411, 412, 413. Principles of Chemical Engineering. 3-3-3

Required of seniors in Chem. E. Prerequisite or concurrent: Chem. E. 311, Chem. E. 310, Math. 201.

Survey of field of Chemical Engineering; control in industrial manufacture; unit operations; flow of fluids and of heat; equipment for and principles involved in such operations as crushing and grinding, separation, evaporation, distillation, filtration; humidification; drying, absorption, and extraction; chemical engineering calculations; design and efficiency of chemical machinery. Walker, Lewis, McAdams and Gilliland, *Principles of Chemical Engineering;* Badger and McCabe, *Elements of Chemical Engineering*.

Mr. Wicker, Mr. Johnson.

Chem. E. 421. Water Treatment. 3-0-0 or 0-3-0 or 0-0-3

Required of seniors in Chem. E. Prerequisite: Chem. E. 311.

Supplies of water; filter plant machinery, equipment and practice; water purification and softening; types of filters; requirements of waters for municipal and manufacturing purposes; water analysis; research on water purification and industrial waste treatment. *Notes.* Mr. Randolph, Mr. Van Note.

Chem. E. 422. Chemistry of Engineering Materials. 3 or 3 or 3

Required of seniors in Chem. E. Prerequisite: Chem. E. 311, M. E. 105 and 227, and Math. 201.

Technical study of engineering materials, suitable materials for manufacturing plants, machines, and special uses; corrosion and chemical action; paints and protective coatings; metallurgy; strength, toughness, and elasticity of metals; chemical, metallographic, and microphotographic examinations of metals and alloys, and other materials; fire assaying. Leighou, *Chemistry of Engineering Materials.* Mr. Johnson, Mr. Van Note.

Chem. E. 423. Electrochemical Engineering. 3-3-3 or 0-0-3

Required of seniors in Chem. E. Prerequisite or concurrent: Chem. E. 311.

Theory and practice of electrochemical industries; principles of electrolysis and other electrochemical processes; electric furnace; electro-thermal operations, electrometallurgy. Mantell, *Industrial Electrochemistry.*

Mr. Randolph, Mr. Van Note, Mr. Lauer.

Chem. E. 425. Gas Engineering. 3 or 3 or 3

Elective for seniors or graduates in Chem. E. Prerequisite: Chem. E. 311.

A gas engineering course; manufacture of industrial fuel gases and their distribution; advances made in the industry; apparatus and equipment; plant design; general practice in gas plants; application and use of gas and the by-products of its manufacture; pipe lines, service connections, gas meters.

Mr. Randolph.

Chem. E. 426. Sanitation Processes. 0-0-3

Prerequisite: Chem. E. 311.

Technical study of the methods of sanitation in industrial plants; equipment and practice in the disposal and treatment of waste materials and sewage; measures necessary in eliminating occupational disease hazards. *Notes.* Mr. Randolph, Mr. Lauer.

Chem. E. 427. Industrial Application of Physical Chemistry. 3 or 3 or 3

Prerequisite: Chem. E. 311.

Special phases of physical chemistry studied technically with reference to the practical application of these principles in the chemical industries such as industrial catalysis, evaporation principles, absorption, equilibrium, applications of phase rule, physical metallurgy, colloids. *Notes.* Mr. Van Note.

Chem. E. 428. Fuel and Combustion Engineering. 3 or 3 or 3

Prerequisite: Chem. E. 411.

Fundamental principles and mechanism of the combustion reactions; quantitative application to problems of design or use of equipment for fuel processing and utilization; and a thorough study of solid, liquid, and gaseous fuels, with complete methods of analysis. Haslam and Russell, *Fuels and Their Combustion.* Mr. Lauer, Mr. Randolph.

Chem. E. 431, 432, 433. Chemical Engineering Laboratory and Design II. 2-2-2

Required of seniors in Chem. E. Prerequisite or concurrent: Chem. E. 411.

A laboratory study of measurement of flow of fluids and heat; crushing and grinding, distillation; evaporation; drying; humidity; filtration and mechanical separation; absorption, and extraction, calculations, design and construction of equipment for these fundamental unit operations in chemical industry. Mr. Wicker, Mr. Johnson.

Chem. E. 429. Chemical Engineering Design. 3 or 3 or 3

Prerequisite or concurrent: Chem. E. 411.

Location, layout, and complete design of the chemical plant and its process equipment. Materials of construction. Economic factors controlling the chemical industry, and optimum design from the standpoint of economic return, process development, pilot plant production studies. *Notes.* Mr. Lauer.

Chem. E. 424. Industrial Oils, Fats and Waxes. 0-0-3 or 3-0-0

Elective for juniors or seniors in Chem. E. Prerequisite: Chem. E. 311.

Commercial practice in the manufacture, refining, and conversion of animal and vegetable oils and their by-products; analyses, tests, and methods of preparation for foods and feeds; drying, semi-drying, and essential oils; industrial fats and waxes. Technical study of petroleum refining and products; lubricants. Mr. Lauer.

Chem. E. 430. Chemical Engineering Thermodynamics. 3 or 3 or 3

Prerequisite or concurrent: Chem. E. 411.

A study of the thermal properties of matter and energy relationships underlying chemical processes. A thorough consideration of fundamental laws of energy as applied to Chemical Engineering problems and processes in industry. Mr. Wicker, Mr. Johnson.

Chem. E. 434. Cellulose and Allied Industries. 3-3-0 or 3-3-3

Required of seniors in Forestry. Prerequisite or concurrent: Chem. E. 311 or Forestry 206, 207.

Cellulose and its compounds; forest raw material for chemical industries; methods and processes; control conditions; machinery; equipment; water requirements; processes for manufacture of paper; rayon; tannin; tar; pitch; turpentine; creosote; wood alcohol; acetic acid; acetone; rubber, and cellulose conversion products; distillation, and extract industries. *Notes.*

Mr. Lauer, Mr. Wicker.

Chem. E. 435. Corrosion: Causes and Prevention. 3-3-3

Prerequisite: Chem. E. 311.

Theories of corrosion; influences of metal composition and methods of manufacture; external influences; corrosion testing; preventive measures against atmospheric, underground, underwater, closed water system, chemical corrosion. Good practices; comparison of corrosive resisting materials; suitability of materials for corrosion resistance in various chemical and industrial uses. Speller, *Corrosion: Causes and Prevention.* Mr. Van Note.

Chem. E. 436. Chemical Principles. 3 or 3 or 3

Prerequisite or concurrent: Chem. E. 311.

Fundamental principles in chemical manufacture and correlation of these principles in unit processes and operation. Hougen and Watson, *Industrial Chemical Calculations. Notes.* Mr. Van Note.

Chem. E. 437. Metals and Alloys. 3 or 3 or 3

Elective for seniors. Prerequisite: Chem. E. 311 and 422 or M. E. 131.

Metals and alloys studied through chemical, thermal, and microscopic analysis; intermetallic compounds, solid solutions, eutectics; internal mechanisms and their effect in ageing, heat treating, mechanical working; modern physical metallurgical problems and practices. Doan, *Principles of Physical Metallurgy.* Mr. Van Note.

Courses for Graduates Only

Chem. E. 501. Chemical Technology—Advanced. 3-3-3

Prerequisite: Chem. E. 411.

An advanced course in problems, processes, and methods of chemical manufacture and production; special problems of local manufacturing plants worked out under plant conditions; optimum production conditions; special study in applied inorganic, applied organic chemistry, and research in applied chemistry. Mr. Randolph, Mr. Lauer.

Chem. E. 502. Industrial Chemical Research. 3-3-3

Prerequisite: Chem. E. 311.

Chemical research on some industrial problem relating to North Carolina resources; practice in industrial plants, control analyses, estimate of losses, costs, data sheets, technical report. Staff.

Chem. E. 503. Chemical Engineering Research. 3-3-3

Prerequisite: Chem. E. 411.

Some plant problem studied exhaustively by making investigations at the chemical plant, and by supplementary experiments and research in the laboratory; measurements, tabulation, graphs, and calculation of some actual plant problem. Staff.

Chem. E. 504. Advanced Chemical Engineering. 3-3-3

Prerequisite: Chem. E. 411, Chem. E. 431, 432, 433.

Advanced study of process equipment, theory, and practice in operation and design for the unit operations, evaporation, distillation, absorption, filtration, drying, crystallization, and air conditioning; Chemical Engineering thermodynamics; coefficients of heat transfer; heat of reactions; evaporators; stills; condensers, and heat exchangers; interrelationships between heat transfer and fluid friction. McAdam, *Heat Transmission* and other texts.

Mr. Wicker, Mr. Randolph.

CHEMISTRY

Professors: A. J. WILSON, *Head of the Department*
L. F. WILLIAMS
G. H. SATTERFIELD
Associate Professor: W. E. JORDAN
Assistant Professors: H. L. CAVENESS
A. D. JONES
Instructors: W. A. REID
W. E. SINGER
C. A. FLANDERS
P. P. SUTTON

Curriculum.—The Department of Chemistry does not offer a Bachelor of Science degree in Chemistry. However, a student may register in the School of Agriculture with a major in Agricultural Chemistry. This curriculum affords extended courses of chemical training which will fit a graduate for positions such as those in State Experiment Stations, and in State and Federal laboratories, for the inspection and control of fertilizers, feeds, foods, and other commodities, and as chemist in industrial plants.

Instruction.—Instruction in the Department of Chemistry embraces the courses of lectures and the related courses of laboratory work which are described in detail under the appropriate heading of each individual course included in the curricula of the Department.

New Building.—The Chemistry Department will be housed in a new four-story brick building in the fall of 1939. This building will provide adequate and modern laboratories for general chemistry and qualitative and quantitative analysis, and for organic, physical, and biological chemistry. Numerous recitation rooms are provided, besides the large main lecture room.

Library.—Part of one wing of the building has been set aside for the General Science Library, supervised by a full-time trained librarian.

Future.—The building is planned to fulfill the needs of the Chemistry Department for the next ten years, and also with a view to later expansion to approximately twice the present size.

Courses for Undergraduates

Chem. 101, 102, 103. General Inorganic Chemistry. 4-4-4

Recitations and laboratory work; theories and laws, history, occurrence, preparation, properties, and uses of the more important elements and their compounds; formulæ, valence, equations and calculations.
Messrs. Caveness, Reid, Jones, Jordan, Satterfield, Singer, Showalter, Sutton, Wilson, and Williams.

Chem. 211. Qualitative Analysis. 4-0-0

Required of sophomores in Ceramic, Chemical, and Mining Engineering and those majoring in chemistry and of sophomores in Textile Chemistry and Dyeing. Prerequisite: Chem. 101, 102, 103.
Chemical analysis: identification and separation of more common ions and analysis of mixtures of salts and of commercial products.
Messrs. Wilson, Caveness, Reid.

Chem. 212. Quantitative Analysis. 0-4-0

Required of sophomores in Ceramic Engineering, Chemistry, Chemical Engineering, and Textile Chemistry and Dyeing. Prerequisite: Chem. 211.
Volumetric methods of analysis, including alkalimetry, acidimetry, oxidation, and reduction methods. Messrs. Wilson, Caveness, Reid.

Chem. 213. Quantitative Analysis. 0-0-4

Required of sophomores in Chemical Engineering and those majoring in Chemistry. Prerequisite: Chem. 211.
A continuation of Chem. 212. Gravimetric methods. Substances of more difficult nature are analyzed, as minerals, steel, alloys, limestone, Paris green, etc. Messrs. Wilson, Caveness, Reid.

Chem. 221. Introduction to Organic Chemistry. 4-0-0 or 0-4-0 or 0-0-4

Required of sophomores in Agriculture. Elective for others. Prerequisite: Chem. 101, 102, 103.

Hydrocarbons, alcohols, aldehydes, ketones, acids, ethers, esters, amino acids, and benzine derivatives; carbohydrates, fats, proteins, and related compounds. Mr. Williams.

Chem. 223. Quantitative Analysis. 0-0-4

Required of students in Textile Chemistry and Dyeing.

A continuation of Chem. 212. Substances of more difficult nature are analyzed, as sulphites, sulphides, bleaching powder, Turkey-red oil, soaps. Messrs. Wilson, Caveness, Reid.

Chem. 233. Quantitative Analysis. 0-0-4

Required of Agr. Chemistry students. Prerequisite: Chem. 212.

Course allows student to choose field of analysis, such as soil analysis, fertilizers, feedstuffs, insecticides, and fungicides. Mr. Wilson.

Chem. 242. Chemical Calculations. 0-3-0 or 0-0-3

Prerequisite: Chem. 101, 102, 103.

Chemical problems, especially in analytical work. Lectures are given in principles, theories, laws, ets., upon which the problems are based; assigned problems for discussion. Mr. Caveness.

Chem. 331. Physical Chemistry. 5-0-0

Required of Cer. E.; elective to others. Prerequisite: Chem. 101, 102, 103.

Fundamental chemical principles from a hysiochemical viewpoint; special attention to silicate analysis, colloids, and phase rule. Mr. Singer.

Courses for Graduates and Advanced Undergraduates

Chem. 401. Historical Chemistry. 2-0-0

Prerequisite: Chem. 101, 102, 103.

Development of Chemistry and the history of men instrumental in the progress of Chemistry. Mr. Williams.

Chem. 402, 403. Theoretical Chemistry. 0-2-2

Prerequisite: Chem. 101, 102, 103.

Atoms and molecules, chemical reactions and conditions influencing them, electronic conception of valence, radio activity. Mr. Williams.

Chem. 411. Advanced Qualitative Analysis. 4-0-0

Prerequisite: Chem. 211 or its equivalent.
Theory and reactions in analysis of more complex compounds. Mr. Wilson.

Chem. 412. Advanced Quantitative Methods. 0-3-0 or 0-0-3

Prerequisite: Chem. 213 or its equivalent.
Methods and apparatus in advanced quantitative analysis; heat of combustion, colorimetry, hydrogen ion concentration, electric combustion of steel, etc. Mr. Wilson.

Chem. 421, 422, 423. Organic Chemistry. 4-4-4

Required of juniors in Chemical Engineering, Chemistry, and Textile Chemistry and Dyeing. Elective for others. Prerequisite: Chem. 101, 102, 103.
Aliphatic and aromatic compounds; practical applications; methods of preparation and purification of compounds, and their structures. Mr. Williams.

Chem. 431, 432, 433. Physical Chemistry. 4-4-4 or 4-4-0

The first two terms only required of Chemical Engineers; elective for Agricultural Chemistry students. Prerequisite: Chem. 213.
Principles of Physical Chemistry; laws and theories, application to various branches of chemistry and to industrial processes. Mr. Singer.

Chem. 441. Food Products and Adulterants. 3-0-0 or 0-3-0

Designed for students in all schools. Prerequisite: Chem. 221 or 421-22-23.
Food principles, cereals, starches, sugars, fats, milk and milk products, the packing house, food preservation, beverages, spices and condiments; food legislation, food advertising. Mr. Satterfield.

Chem. 442. Chemistry of Colloids. 0-3-0

Prerequisite: Chem. 221 or 421-22-23.
Colloidal behavior, osmotic pressures, dialysis, sols and gels, membranes and membrane equilibria, proteins, and Donnan equilibrium. Mr. Jones.

Chem. 451, 452. Physiological Chemistry. 3-3-0

Prerequisite: Chem. 221 or 421-22-23.
Essential chemical facts pertaining to life processes; digestion, absorption, metabolism, secretions, and excretions; lectures, laboratory. Mr. Satterfield.

Chem. 462. Chemistry of Vitamins. 0-3-0 or 0-0-3

Required of juniors in Animal Prod. Prerequisite: Chem. 221 or 421-22-23.
Application of vitamin hypothesis to human nutrition; history, nomenclature, properties, distribution, effects of deficiencies, vitamin values. Mr. Satterfield.

Chem. 472. Blood Analysis. 0-3-0 or 0-0-3

Prerequisite: Chem. 212 and 421-22-23.

Hemoglobin, sugar, urea, uric acid, cholesterol, creatine, creatinine, non-protein nitrogen, amino acid nitrogen, calcium, etc.; Folin-Wu system is emphasized; lectures and laboratory. Mr. Satterfield.

Chem. 481. Agricultural Chemistry. 3-0-0

Prerequisite: Chem. 101, 102, 103, and 221 or 421-22-23.

Feeding the plant; insecticides and fungicides; transforming the plant into human food and animal food. Composition of plants; relation between composition and uses. Mr. Satterfield.

Chem. 482, 483. Food and Nutrition. 0-3-3

Prerequisite: Chem. 221 or 421-22-23.

Open to all students desiring a practical knowledge of the subject.

Carbohydrates, fats, proteins, amino acids, minerals, fiber, vitamins and enzymes; nutritive value of food materials; digestion, food idiosyncrasy; acidosis and alkalosis. Mr. Satterfield.

Chem. 491, 492, 493. Advanced Physical Chemistry. 3-3-3

Prerequisite: Chem. 431-32-33.

An advanced problem course designed for chemical engineers. Mr. Singer.

Courses for Graduates Only

Chem. 501, 502, 503. Organic Chemistry, Advanced 3-3-3

Prerequisite: Chem. 421-22-23.

Principles of Organic Chemistry, current literature; laboratory work and preparation in quantity. Mr. Williams.

Chem. 511. Organic Qualitative Analysis. 3-0-0

Prerequisite: Chem. 421-22-23.

Detection of elements and radicals, group characteristics. Mr. Williams.

Chem. 512. Organic Quantitative Analysis. 0-3-0

Prerequisite: Chem. 212, 421-22-23.

Analysis of organic compounds for carbon, hydrogen, nitrogen, the halogens, sulfur, etc. Mr. Williams.

Chem. 513. Organic Micro-Analysis. 0-0-3

Prerequisite: Chem. 421-22-23.
Tests for compounds, and impurities in quantities too small to be detected by ordinary methods. Mr. Williams.

Chem. 523. Micro-chemical Analysis. 0-0-3

Prerequisite: Chem. 213.
Inorganic micro qualitative analysis; fibres, starches, etc. Mr. Wilson.

Chem. 531, 532, 533. Chemical Research. 3-3-3

Prerequisite: 54 term credits in Chemistry. Open to all graduates.
Special problems that will furnish material for a thesis.
Mr. Jordan, Mr. Satterfield, Mr. Williams, Mr. Wilson.

Chem. 541, 542, 543. Seminar. 1-1-1

Required of graduate students specializing in Chemistry.
Preparation and presentation of abstracts of current publications in the field of Chemistry.

Chem. 552, 553. Biochemistry. 0-3-3

Prerequisite: Chem. 421-22-23, 482-83.
Special topics in Biochemistry. Advanced study in the fields of Biochemistry. Mr. Satterfield.

CIVIL ENGINEERING

Courses for Undergraduates

C. E. 101, 102, 103. Drawing. 1-1-1

Required for freshmen in Forestry.
Plain lettering, common symbols, platting of areas from compass survey notes furnished, filling in contours from notes furnished, tracing, calculation of areas—by planimeter. Finished maps. Sloane and Montz, *Elementary Topographic Drawing.* Mr. Fontaine.

C. E. s200. Surveying.* 3 credits

Prerequisite: Math. 102.
Required in the summer immediately following the freshman year in Agr. Eng., A. E., Cer. E., and E. E. and M. E. following the sophomore year.
The use, care and adjustment of surveying instruments; elementary land surveying, traverse lines, leveling, topographical surveying and stadia measurements. Tracy, *Plane Surveying.* Mr. Mann and Staff.

* Note: Two sessions, (a) Full time, 3 weeks immediately following close of College third term; (b) Half time, 6 weeks concurrently with College Summer School term in order to allow students to schedule summer school work.

C. E. 221, 222, 223. Surveying, Theoretical. 3-3-3

Prerequisite: Math. 102.

Required of sophomores in Civil, Construction, Highway and Sanitary Engineering. C.E. 221-22 required in Forestry (0-3-3), of Geol. Eng., and Landscape Architecture (3-3-0).

Use, care and adjustment of surveying instruments, Land Surveying, Topographical Surveying, Leveling and Theory of stadia measures, plane table, etc.

Third term, railroad surveys, including simple, compound, reverse, and spiral curves, turnouts, etc. Davis, Foote, Rayner, *Surveying*. Rubey, *Route Surveys*. Staff.

C. E. 224. Topographic Drawing. 0-0-1

Prerequisite: C. E. 101-2-3.

Required in Forestry, Landscape Architecture.

Plotting by coördinates; contours and general topography. *Notes*. Staff.

C. E. 225, 227. Field Surveying. 1-0-1

To be taken concurrently with C. E. 221-3.

Required in C. E., Constr. E., San. E., H. E., and Landscape Architecture. C. E. 225 required in Geol. E. (1-0-0), and in Forestry (0-1-0).

Surveying field practice, topographical surveys, railroad and highway curves. Profiles, cross-sections. Staff.

C. E. 226. Mapping. 0-1-0

Prerequisite: M. E. 105-6. To be taken concurrently with C. E. 222.

Required of all students in the Department of Civil Engineering, Geological Engineering, and Landscape Architecture.

Practice in conventional signs and lettering. A complete topographical map and tracing is to be made involving the use of three methods of contour location. Field notes to be furnished. Mr. Fontaine, Mr. Lambe.

C. E. 281. Mill and Mill Village Sanitation. 3-0-0

Prerequisite: Chem. 105.

Mill and mill village water supply and sewage disposal, mosquito and fly control, sanitary milk supply, industrial hygiene. This course given for textile students. Ehlers and Steele, *Municipal and Rural Sanitation*.

Mr. Johnson.

Courses for Advanced Undergraduates

C. E. s300. Surveying and Mapping. 3 credits

Prerequisite: C. E. 221-2-3; C. E. 224.

Required in summer immediately following sophomore year in Forestry.

Boundary; topographical surveys, and calculations of sections of College Experimental Forestry Lands. Finished section maps. Davis, Foote, Rayner, *Surveying*. Staff.

C. E. s310. Advanced Surveying.* 3 credits

Required in the summer immediately following the sophomore year in Civil Engineering.

Prerequisite: C. E. 221-2-3; C. E. 226.

Plane table practice, special problems in surveying practice; triangulation, railroad and highway spirals; hydrographic surveying with sextant; plane table problems; the use and rating of current meters; measurement of stream flow; drainage problems.

Laying out proposed construction work. Topograph, details, special problems. Davis, Foote, Rayner, *Surveying.* Mr. Mann and Staff.

C. E. 321. Materials of Construction. 3-0-0

Required of juniors in C. E., H. E., and Constr. E., San. E., M. E. and A. E. and of seniors in I. E.

The study of materials used in buildings and other engineering structures, with particular reference to their methods of manufacture and physical properties. Two periods lecture and recitation; one period laboratory. Tucker, *Laboratory Manual in the Testing of Materials. Lectures and Notes.* Messrs. Tucker, Bramer, Fontaine.

C. E. 361, 362, 363. Construction Engineering I. 3-3-3

Prerequisite: E. M. 311.

Required of juniors in Constr. E.

Study of working drawings, good practice in masonry and frame construction, estimating quantities. Huntington, *Building Construction Notes and Trade Literature.* Mr. Geile.

C. E. 364. Sanitary and Mechanical Equipment of Buildings. 3-0-0

Prerequisite: E. M. 311-12.

Required of juniors in Constr. E. and in Arch. E.

A study of water supply, soil, waste, and vent-pipe systems, principles and practice of heating and ventilating and a discussion of various other mechanical equipment of a building, such as elevators, dust-collecting systems, etc. Gay and Fawcett, *Mechanical and Electrical Equipment of Buildings.* Mr. Geile.

C. E. 383. Sanitary Engineering. 0-0-3

Required of juniors in San. E. Prerequisite: Chem. 105.

This course covers, in a general way, the field of Sanitary Engineering, including: water supply and sewage disposal; ventilation; mosquito and fly control; refuse disposal; public health laws and organization. Ehlers and Steele, *Municipal and Rural Sanitation.* Mr. Johnson.

* Note: Two sessions, (a) Full time, 3 weeks immediately following close of College third term; (b) Half time, 6 weeks concurrently with College Summer School term in order to allow students to schedule summer school work.

Courses for Graduates and Advanced Undergraduates

C. E. 421, 422. Reinforced Concrete. 3-3-0

Required of all seniors in Department of Civil Engineering and Architectural Engineering.

Prerequisite: E. M. 313, 322.

Derivation of formulas used in reinforced concrete design, use of diagrams and curves. Illustrative problems in design. Turneaure and Maurer, *Principles of Reinforced Concrete Construction.* Mr. Mann, Mr. Bramer.

C. E. 425. Graphic Statics. 1-0-0

Prerequisite: E. M. 313.

Required of al students in Departments of Civil and Architectural Engineering.

Principles involved in the solution of problems by graphical methods. Moments, shears. Resultant pressure on retaining walls. Stress diagrams. Fairman and Cutshall, *Graphic Statics.* Mr. Mann

C. E. 426, 427. Structural Design. 0-3-3

Prerequisite: E. M. 322, C. E. 431.

Required of seniors in C. E., H. E., Constr. E., San. E.

Design of beams, columns, tension members, plate girders, trusses and structures. Bishop, *Structural Design.* Mr. Mann.

C. E. 431, 432. Theory of Structures. 3-3-0

Prerequisite: E. M. 322.

Required of seniors in C. E., H. E., Constr. E., San. E.

Roof trusses; bridge trusses; three hinged arch, lateral bracing and portals; rigid frame, wind stresses in tall buildings, indeterminate trusses, secondary stresses. Sutherland and Bowman, *Structural Theory.* Mr. Geile.

C. E. 431a, 432a. Theory of Structures (abridged). 3-3-0

Prerequisite: E. M. 322.

Required in Architectural Engineering. C. E. 431, 432, to be required if less than five students enroll for C. E. 431a, 432a.

Stress analyses and designs of wooden and steel roof trusses; wood, steel, and reinforced concrete floor systems. Theory and design of columns, footings, retaining walls. Theories for wind stress design in tall buildings.

Mr. Geile.

C. E. 435. Soil Mechanics. 3-0-0

Prerequisite: E. M. 321-22.

Required of all seniors in Civil Engineering.

The classification of soils; their physical characteristics and tests. The suitability of certain types of soils for foundations. Methods of stabilizing soils. General principles involved in selection of soils for foundations.

Mr. Bramer.

C. E. 442. Railroad Economics. 0-3-0

Required of seniors in Civil Engineering. Prerequisite: C. E. 223, E. M. 311.

Economics of railroad location; construction, maintenance and operation; betterment and valuation surveys. Raymond, *Elements of Railroad Engineering.* Mr. Mann.

C. E. 443. Hydraulic Structures. 0-0-3

Prerequisite: E. M. 330.

Required of juniors in Civil Engineering.

Application of the fundamentals of Fluid Mechanics to problems in Hydraulic Engineering; flow in pipes, in canals and natural water courses; design of locks and dams for navigation; flood control and power development; theory of design, installation and operation of pumps and hydraulic motors.

Mr. Riddick.

C. E. 449. Hydrology. 0-0-3

Prerequisite: E. M. 330.

Elective for seniors in Engineering.

The study of the science of the occurrence, distribution and use of water upon the earth with particular reference to North Carolina, including precipitation, evaporation, transpiration, seepage, runoff and stream flow. Meyer, *Elements of Hydrology.* Mr. Van Leer.

C. E. 453. Applied Astronomy. 0-0-4

Prerequisite: C. E. 310.

Required of seniors in C. E. and H. E.

The application of astronomy in determining latitude, azimuth, longitude and time; astronomical observations with transit and sextant; reduction of observations. One credit given for observations. Hosmer, *Applied Astronomy.* Mr. Bramer.

C. E. 461, 462, 463. Construction Engineering II. 3-3-3

Prerequisite: C. E. 361-2-3.

Required of seniors in Constr. E.

Study of construction of reinforced concrete and steel framed structures. Estimation, cost analysis, organization, management of construction plants, field methods, proposals and contracts. Huntington, *Building Construction Notes and Trade Literature.* Mr. Geile.

C. E. 467. Specifications. 0-0-3

Prerequisite: C. E. 321.

Required of seniors in Constr. E. and Arch. E.

Preparation of specifications and legal documents for building operations. Kirby, *Elements of Specification Writing.* Mr. Geile.

C. E. 468. Construction Equipment. 0-3-0

Prerequisite: E. M. 322.

Required in Construction Engineering.

A study of hoists, concrete mixers, excavators, tools, and general equipment used on construction. *Lecture Notes.* Mr. Geile.

C. E. 469. Accident Prevention in Construction. 0-0-3

Prerequisite: E. M. 322.

Required in Construction Engineering.

Causes and costs of accidents in construction. A study of methods used in accident prevention work. A. G. C. *Accident Prevention Manual.* Mr. Geile.

C. E. 481, 482. Sanitary Engineering Laboratory. 1-1-0

Concurrent with C. E. 485, 486.

Required in Civil Engineering and Sanitary Engineering.

Laboratory analysis of sewage and sludge. Inspection trips to sewage disposal plants. Laboratory analysis for determining quality and safety of water. Inspection of waterworks in various cities. *Notes.* Mr. Johnson.

C. E. 483. Financing of Sanitary Utilities. 0-0-3

Prerequisite: Math. 203, C. E. 383.

Required in Sanitary Engineering.

Rates and service charges, collections, operating cost control, bond issues, and budgets. Mr. Johnson.

C. E. 485. Waterworks. 3-0-0

Prerequisite: E. M. 330. C. E. 443.
Required of seniors in C. E. and San. E.
Municipal waterworks; quantity; sources of supply, collection; purification, distribution. Babbitt and Doland, *Water Supply Engineering.*
Mr. Johnson.

C. E. 486. Sewerage. 0-3-0

Prerequisite: E. M. 330, C. E. 443.
Required in C. E. and San E.
Separate and combined sewer system; principles of design and construction; sewer appurtenances; disposal plants. Metcalf and Eddy, *Sewerage and Sewage Disposal.* Mr. Johnson.

C. E. 488. Water Purification. 0-3-0

Prerequisite: E. M. 330, C. E. 485.
Required of seniors in San. E.
Design and operation of water purification plants: sedimentation, coagulation, filtration, and sterilization of water. Recent treatment processes. Inspection trips to various plants. Babbitt and Doland, *Water Supply Engineering.* Mr. Johnson.

C. E. 489. Sewage Disposal. 0-0-3

Prerequisite: C. E. 486.
Required of seniors in San. E.
Design and operation of sewage disposal plants; treatment processes and devices; efficiencies and costs of plants; public health, legal and economic problems involved. Inspection trips to disposal plants. Metcalf and Eddy, *Sewerage and Sewage Disposal.* Mr. Johnson.

Courses for Graduates Only

C. E. 525, 526, 527. Advanced Structural Design. 3-3-3

Prerequisite: C. E. 426, 427.
Analysis and design of fixed, hinged and multispan arches. Complete designs of steel and reinforced concrete structures. MacCullough and Thayer, *Elastic Arch Bridges.* Mr. Geile.

C. E. 531, 532, 533. Advanced Structural Theory. 3-3-3

Prerequisite: C. E. 431-2.
Stress analysis in continuous frames and arches; secondary stresses; wind stresses and space frame-work. Analyses by use of Beggs' Deformeter. Sutherland and Bowman, *Advanced Structural Theory.* Mr. Geile.

C. E. 561, 562, 563. Construction Engineering Research. 3-3-3

Prerequisite: C. E. 461-2-3.

Study of recent advancement and developments in Construction. Original research. Mr. Geile.

C. E. 581, 582, 583. Sanitary Engineering Research. 3-3-3

Prerequisite: C. E. 383, 488, 489.

In the first term a study of recent developments and research in Sanitary Engineering is made from current literature. In the second term a research problem is selected and data on the problem is compiled from literature. In the third term individual research work is done. Mr. Johnson.

C. E. 585, 586. Advanced Sewage Disposal. 3-3-0

Prerequisite: C. E. 489.

Study of sewage, sludge, and industrial wastes, efficiencies obtained by different types of disposal plants, treatment processes and their results, sludge conditioning, digestion and disposal. Mr. Johnson.

C. E. 588, 589. Advanced Water Purification. 0-3-3

Prerequisite: C. E. 488.

Study of water purification processes, primary and secondary treatments, control of tastes and odors, and treatment of colored waters.

Mr. Johnson.

ECONOMICS

Professors: B. F. BROWN (*Chairman*)
R. O. MOEN
M. C. LEAGER
Associate Professors: R. W. GREEN
C. B. SHULENBERGER
Assistant Professor: E. B. MCNATT
Instructor: A. S. MILLER

Courses

Econ. 201-2-3. General Economics. 3-3-3

Required of sophomores in Constr. E., I. E., juniors in Agricultural Teaching, Cer. E., C. E., E. E., Geol. E., H. E., M. E. and Textile curricula, and of seniors in A. E., Chem. E. and San E.

A study of economic institutions and general principles governing production and distribution of wealth under the existing economic organization.

Messrs. Brown, Green, Leager, McNatt, Moen, and Shulenberger.

Econ. 205. Introduction to Economics. 3-0-0 or 0-3-0 or 0-0-3

Required of students in Forestry, Land. Arch., and Ind. Arts.

It treats of the business aspects and economic organization of society; production, distribution, and value of economic goods. Mr. Green.

Econ. 212. Accounting for Engineers. 3-0-0 or 0-3-0

A survey of accounting principles; financial statements, their construction, use, and interpretation. Mr. Shulenberger.

Econ. 301-2-3. Accounting I. 3-3-3

Required of juniors in Agricultural Economics, Industrial Engineering, Textile Manufacturing, and Yarn Manufacturing.

Fundamental principles of theory and practice; interpretation of the structure, form, and use of business statements. Mr. Shulenberger.

Econ. 305. Business Organization. 0-3-0

Required of seniors in Highway Engineering. Prerequisite: Econ. 201-2-3 or 205.

Forms of business enterprises; single enterprises, partnerships, joint-stock companies and corporations, and principles of business management. Mr. Green.

Econ. 307. Business Law. 3-0-0 or 0-3-0 or 0-0-3

Required of seniors in Engineering.

Sources of law, fields of law, contracts, agency, sales, negotiable documents, and the law as it controls business transactions. Messrs. Green and McNatt.

Econ. 311-2-3. Marketing Methods. 3-3-3

Prerequisite: Econ. 201-2-3 or 205.

Marketing functions, agencies, systems, retailing, and marketing analysis; problems in marketing; elements of sales management. Mr. Moen.

Econ. 315. Advertising. 3-0-0

Prerequisite: Econ. 201-2-3 or 205.

Principles of advertising. Mr. Moen.

Econ. 316-7. Sales Management. 0-3-3

Prerequisite: Econ. 201-2-3 or 205.

Administrative policy and organization; sales methods, planning and research; sales control. Mr. Moen.

Econ. 321-2. Money, Credit and Banking. 3-3-0

Prerequisite: Econ. 201-2-3 or 205.

Banking and credit institutions, price changes, monetary and banking developments; Federal Reserve System and money market. Mr. Moen.

Econ. 323. Business Finance. 0-0-3

Prerequisite: Econ. 201-2-3 or 205.

Raising and spending of funds and standards of control. Mr. Moen.

Econ. 325-6-7. Industrial Management. 3-3-3

Prerequisite: Econ 201-2-3.

Internal working of industrial enterprises; control through budget-making, production and planning methods; industrial problems. Mr. Miller.

Econ. 325-6-A. Industrial Management. 3-3-0

Required of seniors in Textile Engineering. Prerequisite: Econ. 201-2-3.

A more specialized course than Econ 325-6-7. Industry in general with emphasis and application to textile industry. Mr. Miller.

Econ. 329. Office Management. 0-0-3

Prerequisite: Econ. 201-2-3 or 205.

Principles of management, office arrangement, filing methods, office personnel, business documents, reports, dictation and correspondence. Mr. Green.

Econ. 331. Labor Problems. 3-0-0

Prerequisite: Econ. 201-2-3 or 205.

History, organization, activities, and policies of organized labor. Recent developments. Mr. Miller.

Econ. 333. Personnel Management. 3-0-0 or 0-3-0 or 0-0-3

Required of Textile seniors; elective for all others.

Prerequisite: Econ. 201-2-3 or 205.

Executive development, adjustment to superiors and subordinates; employee selection, training, working conditions, morale, conference technique, research, public relations; cases involving practical situations. Mr. Miller.

Econ. 334. Traffic Management. 3-0-0

Prerequisite: Econ. 201-2-3.

Functions of traffic departments, shipping, transportation management, rates., etc. Mr. .....

Econ. 335. Time Study. 0-3-0

Prerequisite: Econ. 201-2-3 or 205.

Analysis of shop operation into elements, and the determination of the time for each element; emphasis on factors affecting job specification, and wage rate setting. Mr. .....

Econ. 401-2-3. Accounting II. 3-3-3

Prerequisite: Econ 301-2-3.

Problems of asset valuation such as depreciation, replacements, fire losses, amortization, etc., found in all types of business organizations.

Mr. Shulenberger.

Econ. 404-5-6. Principles of Cost Accounting. 3-3-3

Prerequisite: Econ. 301-2-3.

Cost finding, material costs, labor costs, burden and overhead costs; cost accounting system for manufacturing and extractive industries.

Mr. Shulenberger.

Econ. 408-9. Statistical Method. 3-3-0

Required of juniors in Agricultural Administration (one term). Prerequisite: Econ 201-2-3 or 205.

Statistical methods, statistical types, collection and analysis of statistical data. Mr. Leager.

Econ. 412. Principles of Money and Banking. 3-3-3

Prerequisite: Econ. 321-2.

Analysis and research in the field of money and banking. Selected readings and reports. Mr. Moen.

Econ. 414. Foreign Exchange and Trade. 0-0-3

Prerequisite: Econ. 201-2-3.

Theory of foreign trade, commercial policies, and balance of international payments. Mr. Green.

Econ. 415. Investments. 0-3-0

Prerequisite: Econ. 201-2-3.

Different types of investment securities and methods of judging them. Managing personal finances. Mr. Moen.

Econ. 416. Public Finance I. 0-3-0

Prerequisite: Econ. 201-2-3.

Classes of income and expenditure; incidence of different classes of taxes. Mr. Moen.

Econ. 418. Principles of Insurance. 0-0-3

Elective. Prerequisite: Econ. 201-2-3.

Risk as an element of all agricultural and industrial activity. Such risks as can be covered by insurance are discussed, with the appropriate form of insurance, e.g., employer's liability, workmen's compensation, fire, life, and other forms. Mr. Shulenberger.

Econ. 420. Public Utility Regulation. 0-0-3

Prerequisite: Econ. 201-2-3.

A critical examination of the problem of public utility regulation, including the problems of valuation, rate making, the holding company, public vs. private ownership, security regulations, and related issues. Emphasis is placed upon recent developments. Does not include the railroads. Mr. McNatt.

Econ. 422. Personnel Management. 0-3-3

Prerequisite: Econ. 201-2-3 and additional credits in Economics and Sociology.

Principles of effective management of men, including selection, progressive adjustment, and motivation of personnel in industry. Mr. Miller.

Econ. 501. Advanced Economic Theory. 3-3-0

Prerequisite: Eighteen (18) term credits in Economics.

Recent and current economic theory; principal schools of economists; theory of prices under the system of free enterprise. Mr. McNatt.

Econ. 502. History of Economic Doctrines. 0-0-3

Prerequisite: Econ. 501.

History of economic doctrines from the Mercantilists to the period of Ricardo. Mr. McNatt.

Econ. 515. The Economics of Distribution. 3-3-3

Prerequisite: Econ. 201-2-3 and 311-2-3.

An advanced study of theory and practice of economic distribution. Mr. Moen.

EDUCATION: TEACHER TRAINING

For description of summer school (s) courses see Summer School Bulletin.

Courses for Undergraduates

Ed. 106. Industrial Arts. 3-3-3

Required in Industrial Arts.

Lectures, laboratory work, and visitations. Emphasis on wood, metal, electrical, and printing shop work as meeting needs of general shop teaching. Required as major or minor in Industrial Arts Education. Mr. Boshart.

Courses for Advanced Undergraduates

Ed. 203. Educational Psychology. 3-3-0

Required of students in Education; elective for others.

The meaning of education, child development, problems of adjustment and educational guidance; problems of learning, motivation, interests, and the measurement of educational efficiency. Mr. Garrison.

Ed. 308. Visual Aids. 0-0-3

Required of students in Agricultural Education.

Prerequisite: Junior standing.

Methods and technique of visual instruction; lettering; statistical illustrating; chart, graph, and poster-making; photography; lantern-slide making; projector operation, care and use. Designed for teachers and extension workers. Mr. Armstrong.

Ed. 326. Shop Planning and Equipment. 0-0-3

Making plans for a convenient shop, methods of checking tools, shop layouts, safety devices, and the selection of tools and machinery. Mr. Smith.

Ed. 327. Principles of Industrial Education. 0-3-0

The philosophy of industrial education, a review of Federal and State legislation pertaining to industrial education. The different kinds of schools, such as part-time, all-day trade, general industrial, and evening school. Mr. Smith.

Ed. 332. Project Design, A, B. 3-3-0

Required in Industrial Arts. Prerequisite: M. E. 102 and 103.

The designing of projects suitable for the general industrial arts laboratory of the junior and senior high school or specialized class work. Suitable materials, types of construction, and utility of projects will be considered. Mr. Boshart.

Ed. 344. Problems in Secondary Education. 0-0-3

Required of juniors preparing to teach industrial subjects.

Prerequisite: Ed. 203 and six other credits in education.

Deals with the problems of secondary education, with special reference to the relationships of industrial subjects with the other elements of the program; basic principles, historical perspective; and types of teaching.

Mr. Boshart.

Ed. 361. Organization of Teaching Materials. 3-3-3

Required of those intending to teach industrial subjects and those who because of trade experience desire to teach trade subjects. Prerequisite: Ed. 203, and six other credits in Education.

This course deals with analysis of trades and jobs to determine teaching units. These are to be arranged in teaching sequence with related subject matter, thus developing experience in analysis, course making and lesson planning. Mr. Boshart, Mr. Smith.

Ed. 406. Principles of Teaching. 3-0-0

Required of seniors in Agr. Ed. Prerequisite: Ed. 203.

Principles of teaching related to job of teaching vocational agriculture; motivation, directing study, teaching technique, lesson planning. Mr. Cook.

Ed. 407. Methods of Teaching Agriculture. 5-0-0

Required of students in Agricultural Education. Prerequisite: Ed. 203, 208, or equivalents, and at least 12 credits in Agriculture.

Organization of subject matter; teaching techniques; supervised practice; textbooks and reference material; Future Farmers of America; room arrangement and equipment. Mr. Cook.

Ed. 408. Observation and Directed Teaching. 0-5-0

Required of seniors in Agr. Ed. Prerequisite: Ed. 203, 406, 407, and at least 12 credits in Agriculture.

Observation and teaching vocational agriculture under supervision, participation in the varied activities of the teacher of vocational agriculture.

Staff in Agricultural Education.

Ed. 411. Evening Classes and Community Work. 0-5-0

Required of seniors in Agr. Ed. Prerequisite: Ed. 203, 406, 407, and at least 12 credits in Agriculture.

Community activities of teachers of vocational agriculture, organization and teaching evening and part-time classes. Mr. Cook.

Ed. 412. Materials and Methods in Teaching Agriculture. 0-5-0

Required of seniors in Agr. Ed. Prerequisite: Ed. 203, 406, 407, and 12 credits in Agriculture.

Use of illustrative and actual materials in teaching vocational agriculture; collection and preservation of specimens; chart making; practice in use of materials in directed teaching. Mr. Armstrong.

Ed. 416. Local Survey; Planning a Program. 3-0-0

A course designed to teach methods of surveys of local occupations, and upon the findings plan a suitable program of Industrial Education. Mr. Smith.

Ed. 420. Vocational Guidance. 0-3-0 or 0-0-3

Required of students in Industrial Arts and Occupational Information; elective for others. Prerequisite: Ed. 203, 344, or equivalent.

The course in vocational guidance is intended to give emphasis to the place of guidance in the school program. It treats of the development of educational and vocational guidance, its relation to personnel work, principles and practices of guidance and employment, child-labor legislation, and forms and records for school use. Mr. Boshart.

Ed. 422. Methods of Teaching Industrial Subjects. 3-0-0

Required of seniors in Industrial Arts and those preparing to teach vocational classes in trades and industries. Prerequisite: Ed. 203, 344, and 326.

The basic principles of teaching in the classroom or shop. Intended for those who are teaching or preparing to teach shop and drawing courses. Emphasis will be placed on arrangement of materials, lesson planning, and conduct of class work. Mr. Boshart and Mr. Smith.

Ed. 423. Methods of Teaching Occupations. 3-0-0

Required of seniors expecting to teach occupational information and guidance and elective for others who are interested. Prerequisite: Ed. 203, 344, and 326.

The basic principles of teaching occupational information and guidance. Emphasis will be placed on the selection and preparation of materials, the literature available, and methods of presentation.

Mr. Boshart and Mr. Smith.

Ed. 424. Occupational Studies. 0-0-3

Required of students of Industrial Arts and elective for others. Prerequisite: Ed. 420 and 6 additional hours in Education.

A comprehensive study of the field of occupations. The work will consist of readings, reports, discussions, lectures, and visitations. Analysis of leading occupations will be made with the idea of selecting and preparing teaching units for related subject matter courses. Mr. Boshart.

Ed. 426. Secondary Education in Agriculture. 0-0-3

Prerequisite: Ed. 203 and 6 other credits in Education.

School organization in the United States with special reference to agricultural education, curricula; elimination; movements in guidance and character education, with particular reference to agricultural teaching.

Mr. Cook.

Ed. 428. Diversified Occupations. 3 credits
Ed. 433. Field Work in Secondary Education. 0-3-0

Required of seniors preparing to teach Industrial subjects. Prerequisite: Ed. 326.

A study of the physical equipment types of instruction, and character of work being observed. Work will consist of visits, reports, and conferences. Mr. Boshart.

Ed. 444. Observation and Directed Teaching of Industrial Subjects. 0-3-3

Required of students who desire an "A" grade certificate to teach in North Carolina high schools. Prerequisite: Ed. 326, 422, 433.

Observation of and active participation in phases of teacher activity; emphasis on development of systematic procedure and ability to work independently with students. Students will work in actual situations under supervision. Mr. Boshart, Mr. Smith.

Ed. Ex. 452. Theory of Industrial Arts. 3 credits

Ed. Ex. 454. Practical Arts Problems. 3 credits

Ed. 455. Art Studies in Industrial Art Problems. 1½ or 3 credits

Ed. 457. The Problems of the General and Unit Shops. 3-0-0

Intended for those who are teaching or expect to teach shop work and drawing. Its purpose is to acquaint students with the possibilities of the general shop as compared with those of the unit shop and to aid in setting up procedures for each type of shop under conditions where they can best function. Those taking this course should take parallel courses in shop instruction unless they have had considerable experience. Problems of organization, equipment, instruction sheets and their uses, and courses of study will be considered. Mr. Boshart.

Ed. 460. Special Problems in Teaching Agriculture. 0-3-0

A critical survey of the program of teaching vocational agriculture with emphasis on the course of study. It will include the individual problem of the students in the preparation of a course of study and teaching plans for a specific situation. Mr. Cook and Staff.

Ed. 461 (a-b). Trends in Teaching Vocational Agriculture. 3 or 6 credits

Prerequisites: 18 credits in Education, including 5 in Agricultural Education.

Newer procedures in Teaching Vocational Agriculture, the problems of the out-of-school farm youth, evening class instruction and the F.F.A.

Staff in Agricultural Education.

Ed. 462 (a-b). Course of Study Problems. 3 or 6 credits

Prerequisites: 18 credits in Education, including 5 in Agricultural Education.

Selection and organization of subject matter in Vocational Agriculture, supervised practice. Staff in Agricultural Education.

Ed. 463 (a-b). Guidance and Individual Instruction. 3 or 6 credits

Prerequisites: 18 credits in Education, including 5 in Agricultural Education.

Individualized instruction applied to Vocational Agriculture. Study of the agricultural occupations, guidance and counseling with special reference to pupils in Vocational Agriculture. Staff in Agricultural Education.

Ed. 468. Measurements in Educational Psychology. 0-0-3

Prerequisite: Six credits in Psychology, supplemented by credits in related fields.

An introduction to mental and educational testing. A study will be made of the various types of mental and educational tests now in use. A critical analysis is made of the methods of devising such tests and the application of the results to the various educational activities. Mr. McGehee.

Ed. 476. Psychology of Adolescence. 3-0-0

Prerequisite: Ed. 203 and 6 credits in Education or Psychology.

A study of the nature, growth, social development, and interests of adolescent boys and girls. Especially designed for those concerned with the organization and direction of group activities for boys and girls in rural and industrial centers. Mr. Garrison.

Ed. 481. Character Education. 0-0-3

Prerequisite: Twelve credits in Education.

Nature of the problem, needs for character training, present development, agencies responsible, theories of character development, results of investigations, materials, and methods for teachers. Mr. Cook.

Ed. 503. Problems in Educational Psychology. 3-3-0

Prerequisite: Eighteen credits in Education and Psychology.

The nature, causes, and measurements of individual differences in relation to problems of education; the principles of learning, motivation and conditions of educational improvement; the application of psychological principles to mental and educational measurements. Mr. Garrison.

Ed. 508. Vocational Education. 0-3-0

Required of students in Industrial Arts. Prerequisite: Ed. 203, 344, and 6 additional credits in Education.

This course dealing with the problems of vocational education is intended to give acquaintance with its underlying philosophy, its place in our education, the laws governing it, and the prevailing practices and administration. It is of particular interest to administrators and teachers who have or expect to have to do with the direction of educational work in Agriculture, Homemaking, Industry, and Commerce. It deals with all-day, evening, part-time, and general continuation class work. Mr. Boshart, Mr. Smith.

Ed. 510. Administration and Supervision of Vocational Education. 3-3-0

Prerequisite: Ed. 203, 420, 508, and 344.

Administration and supervisory problems of vocational work. Considers the practices and policies of Federal and State officers, organizations and administration of city and consolidated systems, and individual school departments for Vocational Education. For graduate students majoring in Education. Mr. Boshart.

Ed. 512. Occupational Counseling. 0-0-3

Prerequisite: Ed. 420, 508, or equivalent.

This course is intended for teachers of experience and those interested in the problems of guidance in school and life. Attention is given to group and individual counseling as it may be applied to the junior and senior high schools, colleges or placement offices, and to the procedures of conducting interviews and conferences. Information concerning occupational material will be organized, evaluated, and applied to type cases. The relation to personnel work will be considered as the functions of school and industry are studied. Mr. Boshart.

Ed. 516. Problems in Agricultural Teaching. 3-0-0 or 0-3-0 or 0-0-3

Prerequisite: Ed. 203, 407, and at least 12 other credits in Education and Agriculture. Experience in Agricultural Teaching will be accepted in lieu of Ed. 407.

Investigations, reports, and a critical evaluation of present practices with constructive remedies; course adapted to individual interests and needs.

Staff in Agricultural Education.

Ed. 517. Principles of Agricultural Education. 3-0-0 or 0-3-0 or 0-0-3

Prerequisite: Eighteen credits in Education and Agriculture. Permission to register.

Principles and practices in Agricultural Education in the light of educational research and of changing rural conditions. Mr. Cook.

Ed. 520. Agricultural Education Seminar. 1-1-1

Prerequisite: Eighteen credits in Education.

A critical review of current articles and books of interest to students of Agricultural Education. Mr. Cook, Mr. Armstrong.

Ed. 521. Research in Education. 3-3-3

The student will make a study of one or more research problems under the supervision of some member of the staff of the School of Education. The course will be selected on the recommendation of the member of the faculty with whom the student plans to carry on the study. Staff in Education.

ELECTRICAL ENGINEERING

Courses for Undergraduates

E. E. 201, 202. Electrical Engineering Fundamentals. 3-3-0 or 0-3-3

Required of sophomores in E. E. Concurrent with Phys. 201, 202, 203. Prerequisite: Math. 102.

Fundamental laws of electric, magnetic and dielectric circuits; problem drill. Timble and Bush, *The Principles of Electrical Engineering.*

Mr. Browne.

E. E. 343. Electrical Equipment of Buildings. 0-0-3

Required of juniors in Construction Engineering and seniors in Architectural Engineering. Prerequisite: Phys. 203.

Wiring of buildings for light and power; selection of motors and lighting equipment. Moyer and Wostrel, *Industrial Electricity and Wiring.*

Mr. Lear.

E. E. 113. Electric Shop. 0-0-3

A course offered for students in Vocational Education. Practical electrical problems suitable for secondary school; electrical shop equipment.

Credit is allowed only for students in the Department of Education.

Mr. Lear.

Courses for Advanced Undergraduates

E. E. 301, 302, 303. Electrical Engineering. 3-3-3

Required of juniors in E. E. Prerequisite: E. E. 202.

Principles, performance and characteristics of direct current apparatus, electronics, theory of periodic currents, alternating current circuits and systems. Timble and Bush, *Principles of Electrical Engineering*. Klaeffler, Brennenon and Kerchuer, *D. C. Machinery*. Bryant and Correll, *A. C. Circuits*. Mr. Fouraker, Mr. Keever.

E. E. 305, 306, 307. Electrical Engineering Problems. 1-1-1

Required of juniors in E. E. Concurrent with E. E. 301, 302, 303.

Supervised problem drill. Mr. Fouraker.

E. E. 311, 312, 313. Electrical Engineering Laboratory. 2-2-2

Required of juniors in E. E. Concurrent with E. E. 301, 302, 303.

A laboratory course coördinated with E. E. 301. Ricker and Tucker, *Electrical Engineering Laboratory Experiments*.
Mr. Lear, Mr. Pearsall, Mr. Keever, Mr. Brown, Mr. Glenn, Mr. Winkler.

E. E. 320, 321. Elements of Electrical Engineering I. 3-3-0 or 0-3-3

Required of juniors in Chem. E., C. E., H. E., Constr. E., and San. E., and of seniors in Cer. E., Geol. E., and Min. E., and in Industrial Management. Prerequisite: Math. 202, Phys. 203.

Principles, characteristics and operation of electric equipment and systems. Blalock, *Principles of Electrical Engineering*.
Mr. Lear, Mr. Pearsall, Mr. Keever, Mr. Glenn, Mr. Winkler.

E. E. 331, 332, 333. Elements of Electrical Engineering II. 4-4-4

Required of seniors in M. E. and of juniors in Industrial Engineering. Prerequisite: Math. 202, Phys. 203.

Principles, characteristics, and operation of electric equipment. Loew, *Direct and Alternating currents*.
Mr. Pearsall, Mr. Keever, Mr. Glenn, Mr. Winkler.

Courses for Graduates and Advanced Undergraduates

E. E. 433. Electric Distribution. 0-0-3

Required of seniors in E. E. Prerequisite: E. E. 303.

Low voltage distribution systems. Mr. Keever.

E. E. 401, 402. Alternating Current Machinery. 4-4-0

Required of seniors in E. E. Prerequisite: E. E. 303.
Principles and characteristics of alternating current machinery. Bryant and Johnson, *Alternating Current Machinery.* Mr. Fouraker, Mr. Brown.

E. E. 411, 412, 413. Electrical Engineering Laboratory. 2-2-2

Required of seniors in E. E. Concurrent with E. E. 401, 402, 403.
A laboratory course coördinated with classroom work. Ricker and Tucker, *Electrical Engineering Laboratory Experiments.*
Mr. Pearsall, Mr. Keever, Mr. Brown, Mr. Winkler.

E. E. 403. Electric Transmission. 0-0-4

Prerequisite: E. E. 402.
Theory and characteristics of electric circuits for high tension transmission of power. Bryant and Correll, *Alternating Current Machinery.*
Mr. Fouraker, Mr. Brown.

E. E. 421, 422, 423. Electric Power Applications (Optional with E. E. 425, 426, 427). 3-3-3

Prerequisite: E. E. 303, 307.
Selection of electrical equipment for industrial applications, control equipment; electric traction, electric power plants. Mr. Browne.

E. E. 425, 426, 427. Electric Communication (Optional with E. E. 421, 422, 423). 3-3-3

Prerequisite: E. E. 303, 307.
Circuits and equipment for wire communication; radio and carrier current systems. Everitt, *Communication Engineering.* Mr. Fouraker.

E. E. 437. Illumination. 0-0-3

Required of seniors in E. E. Prerequisite: E. E. 303, 307.
Characteristics of electric lamps; electric lighting systems. Kurneth, *Textbook of Illumination.* Mr. Lear.

E. E. 453. Power Network Calculations. 0-0-3

Prerequisite: E. E. 402.
The method of symmetrical components applied to fault calculation in power system networks. Equivalent impedances of short and long lines with and without terminal grounding and for ground wires, transformer banks, synchronous machines, asynchronous machines. Syntheses of complete systems, with calculations of fault currents for different types of faults.
Mr. Brown.

E. E. 441, 442, 443. Electrical Measurements in Industry. 3-3-3

Prerequisite: E. E. 303 or E. E. 322 or E. E. 333.

Theory and practice of electrical measurements in industry. Instruments and motors, indicating, recording, and integrating types; bridges; potentiometers; thermo-couples; resistance pyrometers; electro-optical pryometers; photo-electric cells and tubes; amplifiers; relays; strobo-scopes; humidity meters; electrical pressure guages. A discussion of industrial applications and methods. Mr. Brown.

Courses for Graduates Only

E. E. 501, 502, 503. Fundamental Principles in Electrical Engineering. 3-3-3

Prerequisite: E. E. 433, 402.

Review of fundamentals in electrical circuit theory; operational calculus methods, transients in electrical, mechanical, and thermal circuits; transients in non-linear circuits; point-by-point solutions; power transmission; stability; control problems and design of control equipment; special applications.

Mr. Fouraker and Mr. Brown.

E. E. 505, 506, 507. Electrical Engineering Seminar. 1-1-1

Prerequisite: Graduation in E. E.

A series of papers and conferences of junior instruction staff and students who are candidates for advanced degrees in electrical engineering, held for the purpose of reviewing the developments in electrical engineering fields of practice and research. Special attention to be given to the methods of collecting, analyzing, and presenting data in a comprehensive manner.

Mr. Brown.

E. E. 521, 522, 523. Engineering Electronics. 4-4-4

Prerequisite: E. E. 201.

Electron tubes in industry, including studies of various types of tubes as rectifiers, amplifiers, oscillators, control devices, photo-electric devices, oscilloscopes, etc. Electro-kinetic theory of gases, potential distribution, and characteristics of different types of conduction studied in detail. Associated circuits. This course includes coördinated laboratory experiments.

Mr. Brown.

E. E. 531, 532, 533. Illumination Engineering. 3-3-3

Prerequisite: E. E. 201.

Fundamental theory combined with broad survey of field, followed by detailed treatment of point sources, surface radiation, symmetric and asymmetric distribution; applications. The photo-chemical theory of vision, visual measurements, applications to design. Mr. Brown.

E. E. 550. Electrical Engineering Research. 9 credits

Acceptance as candidate for Master's Degree.

Individual research in field of Electrical Engineering for the purpose of extending knowledge. Students may elect to conduct their research along technical electrical engineering lines, or in some allied field such as economics of engineering, mathematical methods, etc. Report shall be in form of Master's thesis. Mr. Brown.

ENGINEERING MECHANICS

Professor: G. WALLACE SMITH, D.Sc., *Head of Department*
Associate Professor: N. W. CONNER, M.S.
Assistant Professor: C. E. FELTNER, S.M.C.E.
Graduate Fellows: DAN LIPSCHUTZ, B.S.
P. T. ANGELL, B.S.
W. N. SOUMINEN, B.S.

Courses for Advanced Undergraduates

E. M. 301. Engineering Mechanics (Abridged). 3-0-0 or 0-3-0

Required of students in Cer. E., Ch. E., Geol. E., and I. E. Also required of students in Agr. Eng. Prerequisite: Math. 202. Co-requisites: Math. 203 and Phys. 201.

Statics: Concurrent, parallel and non-concurrent force systems, the determination of their resultants and conditions of equilibrium. Friction, centroids and moments of inertia. Seely and Ensign, *Analytical Mechanics for Engineers.* Messrs. Smith, Conner, Bramer, and Feltner.

E. M. 302. Engineering Mechanics (Abridged). 0-3-0 or 0-0-3

Required of students in Cer. E., Ch. E., Geol. E., and I. E. Also required of students in Agr. Eng. Prerequisites: E. M. 301 and Math. 203.

Kinematics: The motion of bodies without considering the manner in which influencing factors affect the motion. Kinetics: The motion of bodies as affected by unbalanced forces. Seely and Ensign, *Analytical Mechanics for Engineers.* Messrs. Smith, Conner, Bramer, Feltner.

E. M. 311. Engineering Mechanics. 3-0-0 or 0-3-0 or 0-0-3

Required of all students in Engineering except Cer. E., Ch. E., Geol. E., and I. E. Prerequisite: Math. 201. Co-requisites: Math. 202 and Phys. 201.

Statics and Friction: Study of concurrent, parallel and non-concurrent systems of both coplaner and non-coplaner forces. The application of statics to the solution of fundamental engineering problems, including statical friction. Seely and Ensign, *Analytical Mechanics for Engineers.*
Messrs. Smith, Conner, Bramer, Feltner.

E. M. 312. Engineering Mechanics. 3-0-0 or 0-3-0 or 0-0-3

Required of all students in Engineering except Cer. E., Ch. E., Geol. E., and I. E. Also required of students in Agr. Eng. Prerequisites: E. M. 311 and Math. 202. Co-requisites: Math. 203.

Kinematics, centroids and moments of inertia. Seely and Ensign, *Analytical Mechanics for Engineers.* Messrs. Smith, Conner, Bramer, Feltner.

E. M. 313. Engineering Mechanics. 3-0-0 or 0-3-0 or 0-0-3

Required of all students in Engineering except Cer. E., Ch. E., Geol. E., and I. E. Prerequisites: E. M. 312 and Math. 203.

Kinetics: The motions of particles or rigid bodies as they are affected by the action of unbalanced forces. The Newtonian laws of motion, work and energy, power, impulse and momentum are studied and their applications to special engineering problems are illustrated. Seely and Ensign, *Analytical Mechanics for Engineers.* Messrs. Smith, Conner, Bramer, Feltner.

E. M. 320. Strength of Materials (Abridged). 3-0-0 or 0-0-3

Required of Engineering students in Chem. E., E. E., and Ind. E. Also required of students in Agr. Eng. Prerequisites: E. M. 302 or E. M. 312, Math. 203.

A study of the stresses and strains in engineering materials. The study includes tension, compression, shear and torsion; also bending moments and shear in beams. The fibre stresses in simple beams and their distribution throughout the cross section are analyzed. An elementary conception of the deflection of beams and working principles for the design of columns are discussed. Seely, *Resistance of Materials.*

Messrs. Smith, Mann, Conner, Bramer.

E. M. 321. Strength of Materials. 0-3-0 or 0-0-3

Required of all students in Engineering except Chem. E., E. E., Geol. E., and Ind. E. Prerequisites: E. M. 302 or E. M. 312, and Math. 203. Co-requisite: E. M. 313.

A study of the stresses and strains in engineering materials. The study includes tension, compression, shear, and torsion, with emphasis on the applications to engineering structures. Bending moments and shear in simple beams. The fibre stresses in beams and their distribution throughout the cross section are studied in detail. Timoshenko and McCullough, *Elements of Strength of Materials.* Messrs. Smith, Mann, Conner, Bramer.

E. M. 322. Strength of Materials. 3-0-0 or 0-0-3

Required of all students in Engineering except Chem. E., E. E., Geol. E., and Ind. E. Prerequisite: E. M. 321.

A continuation of E. M. 321. Various methods are studied for finding the deflection of beams. The determination of stresses in statically indeterminate beams; the study of columns. Combined stresses. Timoshenko and McCullough, *Elements of Strength of Materials.*

Messrs. Smith, Mann, Conner, Bramer.

E. M. 330. Fluid Mechanics (Abridged). 3-0-0, 0-3-0 or 0-0-3

Prerequisites: E. M. 302 or E. M. 313.

Properties of fluids; statics of fluids; dynamics of fluids; applications to flow of fluids through jets, orifices, tubes, nozzles, weirs; friction losses; dynamic forces on fixed and moving vanes; theory of pumps and turbines. O'Brien and Hickok, *Applied Fluid Mechanics.*

Messrs. Conner, Riddick, Smith, Van Leer.

E. M. 331. Fluid Mechanics. 3-0-0 or 0-3-0

Prerequisites: E. M. 302 or 313.

Properties of fluids; statics of fluids; dynamics of fluids; streamlines; types of flow; energy relations; measuring instruments and devices; forces on fixed and moving vanes; lift and propulsion; circulation; blade element theory; flow of viscous fluids; viscosity; Reynolds number; laminar and turbulent flow; Hager-Poiseuille Law; Stokes Law; dimensional analysis, the Pi theorem. O'Brien and Hickok, *Applied Fluid Mechanics.*

Messrs. Conner, Riddick, Van Leer.

E. M. 332. Fluid Mechanics. 0-3-0 or 0-0-3

Prerequisites: E. M. 331.

Flow of fluids in pipes; types of flow; nature of resistance; effects of roughness; seventh-root law; energy relations; minor losses; pump or turbine in line; flow with free surface; equations; weirs; meters; flow through tubes and orifices; resistance of immersed and floating bodies; Froude's number; dynamics of compressible fluids; dynamic similarity; special topics and problems. O'Brien and Hickok. *Applied Fluid Mechanics.*

Messrs. Conner, Riddick, Van Leer.

Courses for Graduates and Advanced Undergraduates

E. M. 401. Advanced Strength of Materials. 3-0-0

Elective for Engineering seniors and graduate students. Prerequisite: E. M. 320 or E. M. 322.

Detailed study of the deflections of beams, special types of beams, and statically indeterminate systems. Various methods of studying the topics will be discussed and compared. Timoshenko, *Strength of Materials.*

Mr. Smith.

E. M. 402. Advanced Fluid Mechanics. 0-3-0

Prerequisites: E. M. 332, or E. M. 330.

A study of more advanced problems than taken up in E. M. 332 or E. M. 330. Kinematics of fluid flow, conformal mapping, laminar and turbulent flow, the boundary layer, flow around immersed bodies, closed conduits. Instructor's notes and selected references. Mr. Conner.

Courses for Graduates Only

***E. M. 501. Advanced Strength of Materials.** 0-3-0

Prerequisites: E. M. 320 and E. M. 322, Math. 301.

A study of more advanced problems than taken up in E. M. 320 or E. M. 322. Energy of strain, Castigliano's Theorem, impact, Maxwell's Theorem, Mohrs circle. Timoshenko, *Strength of Materials.* Mr. Smith.

***E. M. 502. Applied Elasticity.** 0-0-3

**Prerequisites: E. M. 320 or E. M. 322, Math. 301.

Stress analysis of machine parts, stress concentration, stress in curved bars, torsion and bending in prismatical bars. Stress in thick-walled cylinders, fly wheels, shrink fits. Timoshenko, *Strength of Materials.* Mr. Smith.

***E. M. 503. Applied Elasticity.** 0-3-0

**Prerequisites: E. M. 401 or C. E. 431-432, Math. 301.

Thin bars, plates and slabs in compression, tension, or combined compression and tension. Built-up columns. Timoshenko, *Strength of Materials.* Mr. Smith.

***E. M. 504. Vibration Problems.** 0-0-3

**Prerequisites: E. M. 320 or 322, Math. 301.

Fundamental vibratory systems of one degree of freedom. Balancing of rotating systems, calculation of critical speeds of rotating shafts; vibrating instruments. Systems of several degrees of freedom. Den Hartog, *Mechanical Vibrations.* Mr. Conner.

***E. M. 505. Research in Strength of Materials.** 3-3-3

Special problems and investigations. Mr. Smith.

* Not more than three of these courses will be given in any one year.
** Math. 302, 303 are desirable.

E. M. 506. Research in Mechanical Vibrations. 3-3-3

Prerequisite: E. M. 504.
Special problems and investigations. Mr. Conner.

E. M. 507. Research in Fluid Mechanics. 3-3-3

Prerequisites: E. M. 332 or E. M. 330.
Special problems and investigations. Mr. Conner.

ENGLISH

938-34

Professors: CARLYLE CAMPBELL (*Chairman*)
J. D. CLARK
T. P. HARRISON
A. I. LADU
Associate Professors: L. C. HARTLEY
E. H. PAGET
Assistant Professors: A. M. FOUNTAIN
R. P. MARSHALL
T. L. WILSON
W. K. WYNN
Instructors: K. W. CAMERON
G. LANGFORD
F. H. LYELL
A. B. R. SHELLEY
R. B. WYNNE

Freshman English

Eng. 101, 102, 103. Composition. 3-3-3

Required of all freshmen.
The course is designed to eliminate defects in composition and to develop such proficiency as the student has already attained. Reading and analysis of literary types, with emphasis upon both composition and appreciation; directed supplementary reading collateral with class study; frequent themes, exercises, and reports; conferences. Staff.

Writing

Eng. 211. Business English. 3 or 3 or 3

Prerequisite: Eng. 101, 102, 103.
Practical application of the principles of composition; types of letters; form, style, and tone of effective correspondence; intensive word study. Conferences. Messrs. Wilson and Shelley

Eng. 215. Agricultural News and Feature Writing. 3-3-0

Prerequisite: Eng. 101, 102, 103.

Introduction to, and some practice in writing, simple news articles. Emphasis is placed on writing and class criticism of non-technical newspaper and magazine articles. Subjects determined by student's interest. Vocabulary building; collateral reading. Mr. Wynn.

Eng. 222. Advanced Composition. 0-3-0

Prerequisite: Eng. 101, 102, 103.

A comprehensive study and practice in original and imaginative composition, with emphasis upon the essay, verse, short-story, and the one-act play. Class criticism; conferences. Mr. Shelley.

Eng. 321. Technical Writing I. (For students in Engineering). 3 or 3 or 3

Prerequisites: Eng. 101, 102, 103, 211, 231, and one term of literature.

Principles of writing engineering reports, articles, and papers for public delivery. Readings in essays and technical periodicals. Term papers in library research and technical report writing. Mr. Fountain.

Eng. 323. Technical Writing II. (For students in Agriculture and Forestry). 0-0-3

Prerequisites: Eng. 101, 102, 103, and required sophomore English courses.

Fundamentals of style in professional writing. Reports, articles, papers. Term papers in library research and in professional reports. Mr. Fountain.

Eng. 327. Advanced Feature Writing. 0-0-3

Prerequisite: Eng. 101, 102, 103, and 215 or equivalent.

Practice in writing and criticizing non-technical articles. Subjects determined by student's interest. Vocabulary building; collateral reading. Mr. Wynn.

Speech

Eng. 231. Public Speaking. 3 or 3 or 3

Prerequisite: Eng. 101, 102, 103.

Speech organization and effective delivery; extempore speeches; audience motivation and use of motivating process; acquisition of ease before audience. Messrs. Paget, Fountain, Wynne.

Eng. 236. Parliamentary Practice. 0-2-0

Not to be counted toward the fulfillment of any requirement in English. Prerequisite: Eng. 101, 102, 103.

Rules and customs of assemblies, including organization, motions; participation in and conduct of meetings; parliamentary strategy. Mr. Paget.

Eng. 237. Speech Adjustment. 0-0-2

Prerequisite: Eng. 101, 102, 103.

Poise and pleasing communicative habits in all group contacts; habits of speech, posture, action, and language. Mr. Paget.

Eng. 331. Persuasion. 3-0-0

Prerequisite: Eng. 231 or equivalent.

Psychological forces, methods of conciliation, securing and holding attention, and winning response; extempore speeches and discussions. Mr. Paget.

Eng. 332. Argumentation and Extemporaneous Speaking. 0-3-0

Prerequisite: Eng. 231 or equivalent.

Analysis, brief-drawing and evidence, and methods of proof and refutation; fundamentals of conviction; humanness and forcefulness; extempore speeches, debates, and discussions. Mr. Paget.

Eng. 333. Public Address. 0-0-3

Prerequisite: Eng. 231 or equivalent.

Public addresses for special occasions, including announcement, speech of introduction, committee-room speech, personal conferences, after-dinner speech, speech at professional convention, political speech, college oration, formal sales talk. Mr. Paget.

Literature

Eng. 261. English Literature I. 3-0-0

Prerequisite: Eng. 101, 102, 103.

Chief masterpieces of English literature from *Beowulf* through Shakespeare, with emphasis on social and historical backgrounds. Parallel readings and papers. Messrs. Campbell and Hartley.

Eng. 262. English Literature II. 0-3-0

Prerequisite: Eng. 101, 102, 103.
Significant prose and poetry of the seventeenth and eighteenth centuries, with emphasis on the contribution of the two centuries to modern thought. Parallel readings and papers. Messrs. Campbell and Hartley.

Eng. 263. English Literature III. 0-0-3

Prerequisite: Eng. 101, 102, 103.
Masterpieces of the nineteenth century, with emphasis on changing literary tastes and ideas; the impact of scientific development on thought and literature. Parallel readings and papers. Messrs. Campbell and Hartley.

Eng. 265. American Literature I. 3-0-0

Prerequisite: Eng. 101, 102, 103.
A study of outstanding American literary productions in their historical setting, from the early colonial period to 1840. Mr. Ladu.

Eng. 266. American Literature II. 0-3-0

Prerequisite: Eng. 101, 102, 103.
A study of outstanding American literary productions in their historical setting, from 1840 to 1890. Mr. Ladu.

Eng. 267. American Literature III. 0-0-3

Prerequisite: Eng. 101, 102, 103.
A study of the leading American writers of the present century, with a relation of their works to the social background of the period. Mr. Ladu.

Eng. 271. The Modern Novel. 3-0-0

Prerequisite: Eng. 101, 102, 103.
Analysis of representative novels of England and America, chosen to illustrate modern tendencies in subject matter and technique. Mr. Lyell.

Eng. 272. Modern Drama. 0-3-0

Prerequisite: Eng. 101, 102, 103.
Modern plays, beginning with Ibsen; contemporary English and American productions. Mr. Clark.

Eng. 273. The Development of the Drama. 0-0-3

Prerequisite: Eng. 101, 102, 103.
Origin, progress, and influence; plot, characterization, and interpretation of certain readings. Mr. Clark.

Eng. 275. Southern Writers. 3-0-0

Prerequisite: Eng. 101, 102, 103.
Important writers, with intensive study of Poe, W. G. Simms, Sidney Lanier, Joel Chandler Harris, George W. Cable, O. Henry, Ellen Glasgow, James Branch Cabell. Mr. Marshall.

Eng. 276. English Poetry, 1830-1900. 0-3-0

Prerequisite: Eng. 101, 102, 103.
A study of major poets writing in an age of scientific progress and social change. Emphasis on Browning, Tennyson, and Arnold. Parallel reading and papers. Mr. Hartley.

Eng. 281. Literary Masterpieces. 3-0-0

Prerequisite: Eng. 101, 102, 103.
A background for the enjoyment of literature; an introduction to its appreciation and criteria. Mr. Harrison.

Eng. 282. The Short Story. 0-3-0

Prerequisite: Eng. 101, 102, 103.
An appreciation of the present-day short story through examination of development, structure, type, and style; a comprehensive term paper, or its equivalent in original short fiction. Mr. Wynne.

Eng. 283. The Bible as Literature. 0-0-3

Prerequisite: Eng. 101, 102, 103.
Selected books of the Old and New Testaments as literary and historical documents. (King James Version.) Mr. Ladu.

Eng. 285. Shakespeare. 3-0-0

Prerequisite: Eng. 101, 102, 103.
An analysis of principal plays. Reports on parallel readings.
Mr. Clark.

Eng. 286. The Romantic Period. 0-3-0

Prerequisite: Eng. 101, 102, 103.
Representative poems of Gray, Blake, Burns, Wordsworth, Coleridge, Scott, Southey, Byron, Shelley, and Keats. Mr. Clark.

Eng. 287. Modern Biography. 0-0-3

Prerequisite: Eng. 101, 102, 103.

A study of short modern biographies by representative American and British writers; collateral reading in longer biographical works; reports and assignments for investigation. Mr. Shelley.

Eng. 291. The Eighteenth Century. 3-0-0

Prerequisite: Eng. 101, 102, 103.

English literature of the period from 1700 to 1770; content and critical importance emphasized. (Not offered in 1939-1940.) Mr. Hartley.

ETHICS AND RELIGION

Associate Professor: W. N. HICKS, B.E., A.B., M.A., M.S.,
Head of Department

Purpose.—Since science and ethics are equally necessary phases of human culture and human advance, the Department of Ethics and Religion is dedicated to the encouragement of the objective study of ethics and religion, to the systematic application of reason to daily moral dilemmas, and to the promotion of understanding, tolerance, and coöperation in matters religious.

Courses

Rel. 301. Introduction to Religion. 3-0-0

Prerequisite: Junior or Senior standing.

Characteristics of the major religious sects of America and brief survey of recent trends in religious thought. Mr. Hicks.

Rel. 302. The Life of Jesus. 3-0-0

Prerequisite: Junior or Senior standing.

The career of Jesus of Nazareth as recorded in the Synoptic Gospels and interpreted against the religious, economic, and political background of the age in which Jesus lived. Mr. Hicks.

Rel. 303. The Teachings of Jesus. 0-3-0

Prerequisite: Junior or Senior standing.

The ethical and religious teachings of Jesus as recorded in the Synoptic Gospels, with special emphasis on the contrast between the teachings of Jesus and his contemporaries. Mr. Hicks.

Rel. 304. Comparative Religion. 0-3-0

Prerequisite: Junior or Senior standing.
Brief history, general characteristics, and social significance of the greater living religions of the world. Mr. Hicks.

Ethics 305. Social Ethics. 0-0-3

Prerequisite: Junior or Senior standing.
Review of the ethical codes of the larger professional groups, with analysis of the nature, evolution, and significance of moral values.
Mr. Hicks.

Rel. 306. Problems of Religion. 0-0-3

Prerequisite: Junior or Senior standing.
Religious verities in an age of science and the perplexing problems of the church in modern times. Mr. Hicks.

Ethics 307. Ethical Problems of Adolescence. 3 credits

Prerequisite: Six term credits in Religion, Psychology, or Sociology.
A study of typical adjustment problems of modern youth, with special consideration to changing sex standards and the evolution of new values in this connection. Mr. Hicks.

Rel. Ex. 308. Christian Personality in Its Psychological Aspects. 3 credits

Prerequisite: Six term credits in Religion, Psychology, or Sociology.
An analysis of the psychological validity of the principal ethical teachings of the Sermon on the Mount with emphasis on the relationship of religious attitudes and practices to mental and emotional stability and maturity.
Mr. Hicks.

Ethics 309. Problems of Marital Adjustment. 3-0-0 or 0-3-0 or 0-0-3

Prerequisite: 6 term credits in biological or social science and senior standing. Sections limited to 25 students.
The practical application of pertinent findings of biological and social science to personal problems of premarriage and postmarriage adjustment. Lectures, discussions, and personal conferences. Mr. Hicks.

FORESTRY

Professors: J. V. HOFMANN, *Director of the Division*
L. WYMAN
Associate Professor: W. D. MILLER
Assistant Professor: G. K. SLOCUM

Areas for Field Work.—Some of the field work of the Department of Forestry is now carried on at the **Camp Polk Prison Farm**, near the State Fair Grounds, which has a thousand acres of timber land. The supervision of the timber is handled by class projects.

The Poole Woods, six miles east of Raleigh, is a virgin tract containing stands of short-leaf and loblolly pine. This is an area of seventy-five acres that has been acquired for a laboratory and is a last remnant of the virgin stand of timber in this locality.

The George Watts Hill Demonstration Forest, near Durham, is a tract of 1,400 acres which has been given to the College. It contains stands of short-leaf, loblolly pine, oaks, gum, tulip, dogwood, and all of these species in different associations. It is rolling country and serves admirably for the study of forest problems in the Piedmont section.

The MacLean Forest located in Hyde County, in the eastern part of the State, is in the typical Coastal Plain region. It contains 1,554 acres and is used for demonstration work in the east-coast type.

Jones and Onslow.—A large tract of land has recently been acquired in Jones and Onslow Counties in the southeastern part of the State, which consists of more than 84,000 acres and has the various types of timber found in this region. The large areas of virgin timber make a very complete laboratory for studying forest development and succession.

Total Areas.—In all, the Forestry Department has available about 87,000 acres on which to do field work, demonstration, and research. These areas include the various types found in North Carolina except those of the Mountain Region.

The Arboretum area of seventy acres near Raleigh is being developed to contain all of the tree species and associated shrubs that grow in this climatic condition. It contains swamp land and upland which adapts it for this use. More than a hundred tree species have already been planted in this area.

The Wood Technology Laboratory contains a representative collection of the more common woods and will be gradually extended.

The Timber-Testing Laboratory, in connection with the Engineering Experiment Station, contains the machines for the various timber tests.

Greenhouse space is available for special problems in forest research.

Courses for Undergraduates

For. 101, 102, 103. Elementary Forestry. 1-1-1

Required of freshmen in Forestry.

Study of the nature and development of forests of the world, with special study of the forests of the United States. A correlation of all sciences required in forestry. Field trips are included. Mr. Hofmann.

For. 111. Principles of Forestry. 3-0-0

Required of sophomores in Agriculture.

Elective for junior and senior students not in Forestry.

Forest conditions in the United States and the relation of the forest problems to other fields of industry. World forests as related to local and national problems. Mr. Slocum.

For. 202. Wood Technology. 0-3-0

Required of sophomores in Forestry. Prerequisite: Bot. 203.

Microscopic slides of the conifers and broad-leaved trees are studied in order to determine the occurrence, form, and structure of the wood elements. Identification by means of the hand lens is especially emphasized. Mr. Slocum.

For. 203. Timber Physics. 0-0-3

Required of sophomores in Forestry. Prerequisite: For. 202.

Mechanical properties of wood. Strength tests. Methods of testing. Growth conditions that produce the best timber for specific purpose. Mr. Slocum.

For. s204. Silviculture. 3 credits

Sophomore summer camp. Prerequisites: Bot. 211, 213.

Study of growth and development of forest stands. Establishment and measurement of sample plots. Mr. Miller, Mr. Slocum.

For. s214. Dendrology. 3 credits

Sophomore summer camp. Prerequisite: Bot. 211, 213.

Identification and study of trees in Piedmont, Coastal, and Mountain sections of North Carolina. Mr. Slocum, Mr. Miller.

For. 301. Timber Preservation. 3-0-0

Elective for juniors and seniors in Forestry. Prerequisite: For. 202.

Lumber and timber preservatives and their use. Methods of preservation. Relation of preservation to forestry and industry. Field trip to industrial plant. Mr. Slocum.

Courses for Advanced Undergraduates

For. s304. Mensuration III. 3 credits

Sophomore summer camp. Prerequisite: C. E. 221, 222.

Field data for stand and yield tables, stem analysis, and timber surveys.

Mr. Slocum, Mr. Miller.

For. 311. Silviculture I. 3-0-0

Required of juniors in Forestry. Prerequisite: For. s204.

Factors affecting tree growth and distribution. Forest regions, sites, stands, and types. Silvical requirements of important tree species.

Mr. Miller.

For. 312. Silviculture II. 0-3-0

Required of juniors in Forestry.

Production, collection, extraction, storage, and planting of forest-tree seeds. Mr. Slocum.

For. 313. Nursery Practice. 1 or 1 or 1

Preparation, seeding, watering, and weeding of seed beds in school nursery.

Mr. Slocum.

For. 321. Forest Products. 3-0-0

Required of seniors in Forestry. Prerequisite: For. 202.

A study of the source and method of obtaining derived and manufactured forest products other than lumber. Mr. Wyman.

For. 323. Forest Utilization. 0-0-2

Required of seniors in Forestry.

The problems of more complete utilization of forest resources. Utilization of present waste in commercial practice. Mr. Wyman.

For. 333. Methods of Research in Forestry. 0-0-3

Required of juniors in Forestry. Prerequisite: For. s204.

Methods of research used by the United States Forest Service, experiment stations, the Madison Laboratory, and State and private research organizations. Sample plot technique. Mr. Miller.

Courses for Graduates and Advanced Undergraduates

For. 402, 403. Mensuration I, II. 0-3-3

Required of juniors in Forestry. Prerequisite: For. s304.

The measurement of timber, both standing and felled; log rules, form factors, stem analysis and growth.

Methods of making volume, growth, and stand tables. Increment and yield studies.

Development of stand and yield tables from field data. Timber surveys.

Mr. Slocum.

For. 411. Silviculture III. 3-0-0

Required of senoirs in Forestry. Prerequisite: For. 312.

Methods of cutting to secure natural regeneration. Intermediate cuttings and their effect on the stand. Forest protection. Mr. Miller.

For. 412. Silviculture IV. 0-3-0

Required of seniors in Forestry.

The application of silvicultural methods in the forests of the United States.

Mr. Miller.

For. 421. Logging. 3-0-0

Required of seniors in Forestry. Prerequisite: For. 311.

The logging industry and transportation methods. Logging costs. Application of methods to specific conditions. All forest regions are covered, discussing the problems of each. Mr. Wyman.

For. 422. Lumbering. 0-3-0

Required of seniors in Forestry.

The manufacture and re-manufacture, transportation and handling of lumber. Grades and grading of lumber. Mr. Wyman.

For. 423. Lumber Seasoning. 0-0-2

Required of seniors in Forestry.

Air-seasoning and kiln-drying of lumber. Kiln construction and operation. Defects and their control. Mr. Wyman.

For. 431, 432. Forest Management. 3-3-0

Required of seniors in Forestry. Prerequisite: For. 311.

The principles of management of timber lands for economic returns. The normal forest is taken as the ideal. The application of regulation methods to the forest. A typical working circle as developed by the United States Forest Service is studied for each forest region. Mr. Hofmann.

For. 433. Advanced Wood Technology. 0-0-3

Advanced microscopic identification of the commercial woods of the United States. Microscopic work in anatomy and identification. Mr. Slocum.

For. 442. Forest Finance. 0-3-0

Required of juniors in Forestry. Prerequisite: For. 311.

Forests as investments: interest, carrying charges, financial maturity, and relation of intermediate to final and net incomes. Forest taxation, hazards in forest investments, and forest insurance. Mr. Wyman.

For. 443. Timber Appraisal. 0-0-2

Required of seniors in Forestry.

Field and office methods of valuing timber lands, with special reference to stumpage appraisal; the evaluation of damages to timber and forest property. Mr. Wyman.

For. 452. Seminar. 0-2-0

Required of seniors in Forestry.

A round-table discussion of forestry problems, trends of development in forestry and related sciences. Forestry Faculty.

For. 453. Senior Field Trip. 0-0-3

Required of seniors in Forestry.

An extensive survey of logging, lumbering and utilization of forest products throughout the Southeast. A complete series of reports covering all plants and operations visited is required. Mr. Wyman.

For. 461-462-463. Silviculture Problems. 3-3-3

Elective for seniors; time arranged.

Assigned problems or research experiments to be carried out to completion by the student. A written report of procedure and results will be required. Mr. Miller.

For. 472, 473. Logging Problems. 0-3-3

Elective for seniors; time arranged.

Assigned or selected problems in logging in specified regions. A complete written report required for credit. Mr. Wyman.

For. 481-482-483. Manufacturing Problems. 3-3-3

Elective for seniors; time arranged.

Assigned or selected problems applying to the manufacture or re-manufacture of lumber. A complete written report required for credit. Mr. Wyman.

For. 491, 492, 493. Forest Management Problems. 3-3-3

Elective for seniors; time arranged.

The student must complete a definite problem in management.

Mr. Hofmann.

Courses for Graduates Only

For. 501, 502, 503. Advanced Forest Management Problems. 3-3-3

Complete management program for a specific forest area. Mr. Hofmann.

For. 511, 512, 513. Advanced Silviculture Problems. 3-3-3

Assigned or selected problems or experiments in silviculture. A written report required for credit. Mr. Miller.

For. 521, 522, 523. Advanced Logging Problems. 3-3-3

Selected research logging problems of an advanced nature. Mr. Wyman.

For. 531, 532, 533. Advanced Lumber Manufacturing. 3-3-3

Selected advanced problems dealing with the manufacture and seasoning of lumber. Mr. Wyman.

For. 541, 542, 543. Advanced Utilization Problems. 3-3-3

Problems of an advanced grade in some phase of forest utilization.

Mr. Wyman.

For. 551, 552, 553. Forest Valuation. 3-3-3

Planning, organizing, and conducting, under general supervision, an important research project in one of the fields of valuation. Mr. Wyman.

For. 561, 562, 563. Problems in Research. 3-3-3

Specific forestry problems that will furnish material for a thesis.

Mr. Miller.

GEOLOGY

Courses for Undergraduates

Geol. 101. Earth History. 0-3-0

Elective. Not to be taken after Geol. 120, 220 and 222.

Introductory course in General Geology: changes in the earth, and underlying physical and life processes. Bradley, *The Earth and Its History.*

Mr. Stuckey.

Geol. 120. Physical Geology. 4 or 4 or 4

Required of freshmen in Basic Agriculture, of sophomores in Forestry and Landscape Architecture, and of teachers of Agriculture.

Physical Geology as related to forces acting in and on the earth, and materials of the earth's crust. Lectures, laboratories and field trips. Longwell, Knopf and Flint, *Outlines of Physical Geology.*

Mr. Stuckey, Mr. Parker, Mr. George.

Geol. 207. Ex. Physical Geography. 3-3-0

A. The processes and forces involved in the development of land forms.

B. The physiographic provinces of the United States and their importance. Some special study of the physical geography of North Carolina.

Mr. Stuckey.

Geol. 220. Engineering Geology. 3-0-0 or 0-0-3

Prerequisite: Chem. 101.

Required of sophomores in Agricultural, Ceramic, Civil, Geological, Highway and Sanitary Engineering.

The principles of general geology and their application to engineering problems. Lectures, laboratories and field trips. Ries and Watson, *Elements of Engineering Geology.* Mr. Stuckey, Mr. Parker, Mr. George.

Geol. 222. Historical Geology. 0-3-0

Prerequisite: Geol. 120 or 220.

Required of sophomores in Geological Engineering.

Sequence of events in development of the geology of the North American Continent. Lectures, laboratories and field trips. Schuchert, *Outlines of Historical Geology.* Mr. Parker.

Geol. 230. Mineralogy. 3-0-0 or 0-0-3

Prerequisite: Chem. 101-103-105.

Required of sophomores in Ceramic and Geological Engineering, and of seniors in Chemical Engineering.

Crystallography, and Physical and Chemical Mineralogy. Lectures and laboratory work. Kraus and Hunt, *Mineralogy.* Mr. Stuckey.

Geol. 303. Physiography. 0-0-3

Prerequisite: Geol. 120 or 220. Required of juniors in Geological Engineering.

A systematic study of the land forms of the United States and their relationships to process and stage of development and adjustment of topography to structure. Lectures, map interpretations and field trips. Mr. Stuckey.

Geol. 325. Geology and Mineral Resources of North Carolina. 3-0-0

Prerequisite: Geol. 222. Required in Geological Engineering.
Physical geography, general geology, common rocks and minerals, and mines and quarry products of the State. Lectures, laboratories and field trips.
Mr. Stuckey.

Geol. 332. Advanced Mineralogy. 0-3-0

Prerequisite: Geol. 230. Required in Geological Engineering.
A continuation of Geol. 230. Special attention to chemical and blowpipe properties of a larger group of important minerals. Lectures and laboratory work. Mr. Stuckey.

Geol. 338. Thermal Mineralogy. 0-3-0

Required of juniors in Cer. E. Prerequisite: Geol. 230 and Chem. 231.
A study of the behavior of ceramic materials as controlled by variations in composition, temperature and pressure. Mr. Stuckey.

Geol. 352. Structural Geology. 0-3-0

Prerequisite: Geol. 120 or 220. Required in Geological Engineering.
The arrangement and deformation of the different rock masses composing the earth's crust. Lectures, laboratories and field trips. Nevin, *Principles of Structural Geology.* Mr. Parker.

Geol. 412. Economic Geology. Non-Metals. 0-3-0

Prerequisite: Geol. 120 or 220, 230, and Chemistry 101, 103, 105.
Required of seniors in Geological Engineering.
Mode of occurrence, association, origin, and uses of non-metallic minerals. Lectures, laboratories and field trips. Ries, *Economic Geology.* Mr. Stuckey.

Geol. 413. Economic Geology. Metals. 0-0-3

Prerequisite: Geol. 120 or 220, 230, and Chemistry 101, 103, 105.
Required of seniors in Geological Engineering.
Mode of occurrence, association, origin, and uses of leading metal-bearing minerals. Ries, *Economic Geology.* Mr. Stuckey.

Courses for Graduates and Advanced Undergraduates

Geol. 431, 432, 433. Optical Mineralogy. 3-3-3

Prerequisite: Geol. 230, and Physics.
Required of seniors in Ceramic and Geological Engineering.
Theory of light as applied to the polarizing microscope, practice in determining minerals in thin sections and by immersion methods. Lectures and laboratory work. Rogers and Kerr, *Thin-Section Mineralogy.*
Mr. Stuckey, Mr. Parker.

Geol. 441. Petrology. 3-0-0

Prerequisite: Geol. 120 or 220, 230, and Chemistry 101, 103, 105.
Required of juniors in Geological Engineering.
Materials of the earth's crust; rock-forming minerals; identification, origin, classification, and distribution of rocks; important rocks for building and ornamental purposes. Lectures, laboratories and field trips. Pirsson, *Rocks and Rock Minerals.* Mr. Parker.

Geol. 461. Advanced Engineering Geology. 3-0-0

Prerequisite: Geol. 352. Required of seniors in Geological Engineering.
Analysis of geologic factors in relation to specific engineering projects.
Mr. Stuckey.

Geol. 462. Stratigraphy and Index Fossils. 0-3-0

Prerequisite: Geol. 222 and 441. Required of seniors in Geological Engineering.
Distribution and conditions of origin of principal geologic formations in North America. Key fossils characteristic of each period.
Mr. Stuckey and Mr. Parker.

Geol. 463. Field Methods. 0-0-3

Prerequisite: Geol. 352 and 441. Required of seniors in Geological Engineering.
Methods of field observation and the use of geologic surveying instruments. Construction of a complete geologic map of a specific area. Lectures, laboratories and field trips. Mr. Parker.

Geol. 471, 472, 473. Mining Engineering. 3-3-3

Prerequisites: Geol. 230 and 352, and C. E. 207. Required of seniors in Geological Engineering.
Methods of mining, both open cut and underground. Mine examination and valuation, ore dressing. Mr. .....

Courses for Graduates Only

Geol. 511, 512. Advanced Economic Geology. 3-3-0

Prerequisite: Geol. 412 and 413.
Detailed study of the origin and occurrence of specific mineral deposits.
Mr. Stuckey.

Geol. 543. Advanced Petrography. 0-0-3

Prerequisite: Geol. 433 and 441.
Application of the petrographic microscope to the systematic and descriptive study of rocks. Mr. Stuckey and Mr. Parker.

Geol. 591, 592, 593. Geological Research. 3-3-3

Prerequisite: Permission of the Instructor.

Lectures, reading assignments, and reports. Special work in Geology to meet the needs and interests of the students. Mr. Stuckey, Mr. Parker.

HIGHWAY ENGINEERING

Courses for Advanced Undergraduates

H. E. Ex. 101. Accidents and Their Prevention. 3 credits

A general study of the problem of accidents and their prevention, including accidents in the home, in industry, in transportation and public accidents.

H. E. 322, 323. Highway Engineering I. 0-3-3

Prerequisite: C. E. 221-2-3.

Required of all juniors in Civil Engineering.

History, economics, and administration of highways; construction and maintenance of highways; field and office methods; grading and drainage. Bruce, *Highway Design and Construction.* Mr. Tucker.

H. E. 332, 333. Materials Testing Laboratory. 0-1-1

Prerequisite: C. E. 321.

Required of seniors in Civil Engineering and one term only for juniors in A. E. and Cer. E.

The testing of materials used in construction. For the students in Civil and Highway Engineering, emphasis is placed on those materials used in road construction; for the students in Architectural and Construction Engineering, emphasis is placed on those materials used in the building industry. Tucker, *Manual in the Testing of Materials.* Mr. Tucker.

Courses for Graduates and Advanced Undergraduates

H. E. 421, 422. Highway Engineering II. 3-3-0

Prerequisite: H. E. 322-3.

Required of seniors in H. E.

The economic location of highways; design and construction of high-type pavements; administration of city streets. Lectures and notes.

Mr. Tucker.

H. E. 423. Transportation. 0-0-3

Prerequisite: H. E. 322-3.

Required of seniors in C. E. and H. E.

The transportation systems; development and uses; operation and maintenance; control and methods of taxation. *Lectures and Notes.* Mr. Tucker.

H. E. 425, 426. Highway Office Practice and Design. 1-1-0

Prerequisite: H. E. 322-3.
Required of seniors in H. E.
The preparation of road plans, the calculation of yardage and balancing of quantities; the design of sections; plans for drainage structures and short-span bridges. *Lectures and Notes.* Mr. Tucker.

Courses for Graduates Only

H. E. 511, 512, 513. Highway Research. 3-3-3

Prerequisite: Eighteen term credits in H. E.
A study of the important research projects in the field of highway transport or that of highway engineering. The first term is usually given to the preparation of a bibliography of highway research projects; the second term is devoted to the preparation of papers on the results of specified research projects; while the third term is devoted to original research and investigation. Mr. Tucker.

HISTORY AND GOVERNMENT

Associate Professor: D. A. LOCKMILLER
Assistant Professors: L. W. BARNHARDT
L. W. SEEGERS
Instructor: GEORGE BAUERLEIN, JR.

Courses in History

Hist. 101, 102, 103. Economic History. 3-3-3

An analytical examination of the important changes in the organization of European society and the forces which produced these changes during the periods of expansion and industrialization, as a background for a general treatment of the agricultural, industrial, and commercial development of the United States. Messrs. Bauerlein, Lockmiller, Seegers.

Hist. 104. World History. 2-2-2

Required of freshmen or sophomores who do not take Military Science.
A general survey of Western civilization from its beginnings to the present day. Mr. Barnhardt.

Hist. 200, 201, 202. History of the United States. 3-3-3

Elective for one, two, or three terms.
A chronological treatment of the political, diplomatic, and constitutional history of the United States in the light of its economic and social significance. Mr. Bauerlein.

Hist. Ex. 203. Medieval History. 3 credits

A survey of the political, social, economic, ecclesiastical, and cultural history of Europe from the fifth century to the close of the fifteenth century. Mr. Barnhardt.

Hist. 204, 205, 206. Modern and Contemporary Europe. 3-3-3

Elective for one, two, or three terms.

A survey of the economic, social, political, and cultural developments in Europe from the Protestant Reformation to the Munich Pact (1938). Mr. Barnhardt.

Hist. 303. North Carolina History. 0-3-0

Elective.

A general survey of the political, social, economic, and cultural developments in North Carolina, with special emphasis on the nineteenth and twentieth centuries. Mr. Barnhardt.

Hist. 307, 308, 309. Economic and Social History of the South. 3-3-3

Elective, one, two, or three terms.

A study of the economic and social history of the Southern States. Lectures, readings, and reports. Mr. Lockmiller.

Hist. 310. American Biography. 0-3-0

Elective.

Representative men and women in American politics, law, religion, agriculture, industry, commerce, science, literature, and art. (Not offered in 1939-40.) Mr. Lockmiller.

Hist. 318. Economic and Social History of Agriculture. 0-0-3

Required of seniors in Agricultural Administration; elective for others.

Influence of agriculture on national and world issues; the economic and social status of the farmer, with special emphasis on the United States. Mr. Seegers.

Hist. Ex. 320. History of Modern England. 3 credits

Survey of English political, social, economic, and diplomatic history, with emphasis on the last century. Mr. Barnhardt.

Hist. Ex. 321. The Latin American Republics. 3 credits

Social, economic, and political development of Latin America since 1810. Mr. Lockmiller.

Hist. Ex. 322. Contemporary History of the United States. 3 credits

Significant developments in the United States since 1914, with particular emphasis on post-war problems, foreign affairs, and the "New Deal."
Mr. Lockmiller.

Courses in Government

Gov. 200. American National Government. 3-0-0

Elective.
A study of the origins, organization, and functions of the government of the United States, including constitutional decisions and the New Deal.
Mr. Lockmiller.

Gov. 201. State Government and Administration. 0-3-0

Elective.
A study of Federal-State relations, and the organization and administration of state and county governments. Special attention will be given to problems of government in North Carolina. Mr. Lockmiller.

Gov. 202. Municipal Government and Administration. 0-0-3

Elective.
A study of the history, organization, and administration of American municipal corporations. This course is designed to supplement technical courses in Sanitary Engineering and City Landscape Architecture.
Mr. Lockmiller.

Gov. 206. European Governments. 3-0-0 or 0-0-3

Elective.
A study of the government of England, France, Germany, Italy, and Russia. Mr. Barnhardt.

Gov. 300. American Political Parties. 3-0-0

Elective.
The origin and development of political parties in the United States, their functions, organization, regulation, campaign methods, and elections. (Not offered in 1939-40.) Mr. Lockmiller.

HORTICULTURE

Professor: M. E. GARDNER, *Head of the Department*
Associate Professor: G. O. RANDALL
Assistant Professor: J. G. WEAVER

Equipment.—The Department of Horticulture is well prepared in classrooms and in laboratory and field equipment to offer instruction in its several important and diverse fields.

Pomology and Small-Fruit Culture.—The College orchards and vineyards, the laboratories, a nursery plot, and other facilities are available to treat every phase of fruit-growing from the selection and propagation of varieties to the details of orchard management.

Olericulture and Floriculture.—Four modern greenhouses are an important part of the equipment of the Department, and are used primarily for experimental and instructional work in these two important and growing fields of horticulture. Potting rooms, propagation benches, and other more specialized equipment are used for both undergraduate and graduate instruction. Land and equipment to demonstrate and study details of commercial olericulture are convenient to the greenhouses.

Special Study and Research.—A Physiological and a Cytological Laboratory, calculating machines, library, greenhouses, and land are available to graduate and undergraduate students to carry on special studies. Projects conducted by the Experiment Station Staff are also available for study and observation.

Courses for Undergraduates

Hort. 203. General Horticulture. 0-0-3

Required of sophomores in Agriculture.

A course designed to give a general insight into the field of horticulture, including geographic centers of production and elements of culture of fruit, vegetable, and floricultural crops. Mr. Gardner, Mr. Randall, Mr. Weaver.

Hort. 301. Plant Propagation and Nursery Practice. 3 or 3 or 3

Required of majors in Horticulture; elective for other juniors and seniors in Agriculture and Forestry.

Study of methods and practice in seedage, cuttage, separation and division, budding and grafting. Cultural principles and practices in growing nursery stock. Mr. Randall, Mr. Weaver.

Hort. 302. Vegetable Forcing. 0-3-0

Prerequisite: Hort. 203. Required of majors in vegetable growing; elective for other juniors and seniors in Agriculture.

Production and management of vegetable crops under glass. Practice in growing vegetables under protection. Mr. Randall.

Hort. 303. Vegetable Gardening. 0-0-4

Prerequisite: Hort. 203. Required of majors in vegetable growing and fruit growing; elective for other juniors and seniors in Agriculture.

Location, soil preparation, fertilization, irrigation, and general culture applicable to vegetable production. Mr. Randall.

Hort. 311. Small Fruits and Grapes. 3-0-0

Prerequisite: Hort. 203. Required of majors in fruit growing and vegetable growing; elective for other juniors and seniors in Agriculture.

A course in the culture and production of small fruits, including strawberries, dewberries, blackberries, blueberries, raspberries, currants, and grapes. Mr. Gardner.

Hort. 313. Home Floriculture. 0-0-3

Required of majors in vegetable growing; elective for other juniors and seniors in Agriculture.

Principles and methods of growing garden flowers and house plants, including varieties and their adaptability. Mr. Randall.

Hort. 321. Fruit and Vegetable Judging. 2-0-0

Prerequisite: Hort. 203. Elective for juniors and seniors in Agriculture.

Practice in variety identification, and in judging plates, collections, boxes, and commercial exhibits of fruits and vegetables. Mr. Gardner, Mr. Randall.

Hort. 331. Fruit Growing. 4-0-0

Prerequisite: Hort: 203. Required of majors in fruit growing, vegetable growing, poultry and animal husbandry; elective for other juniors and seniors in Agriculture.

A study of factors underlying fruit production; temperature and moisture relations; culture, fertilization, pruning, fruit setting, yield, and storage. Mr. Gardner.

Hort. 341. Commercial Floriculture. 4-0-0

Prerequisite: Hort. 203, 301. Required of majors in floriculture; elective for other juniors and seniors in Agriculture.

A study of the commercial production of the principal floral crops under protection and in the open, including actual planting and care of the crops. Mr. Randall.

Courses for Graduates and Advanced Undergraduates

Hort. 401. Systematic Pomology (Offered in alternate years). 2-0-0

Prerequisite: Hort. 331. Required of majors in pomology.

Fruit varieties: their description, identification, nomenclature, and classification; their relationships and adaptations. Judging methods and standards. Mr. Gardner.

Hort. 411. Systematic Olericulture (offered in alternate years). 2-0-0

Prerequisite: Hort. 303. Required of majors in vegetable growing.

Vegetable varieties; their description, identification, nomenclature and classification; their relationships and adaptations. Mr. Randall.

Hort. 412. Experimental Horticulture. 0-3-0

Prerequisite: Hort. 331, 303, 341.

A systematic study of the sources of knowledge and results of experiments in fruit growing, vegetable growing, and floriculture.

Mr. Gardner, Mr. Randall.

Hort. 421-422-423. Horticultural Problems. 2-2-2

Required of all majors in Horticulture. Prerequisite: Twelve credit hours in Horticulture.

Systematic investigation of some phase of horticulture. Each student chooses his own subject of study and pursues it independently, under direction of the instructor. Mr. Gardner, Mr. Randall.

Hort. 431, 432, 433. Senior Seminar. 1-1-1

Required of all majors in Horticulture. Prerequisite: Twelve credit hours in Horticulture.

A discussion of problems of interest to horticulturists. Discussion topics are assigned to students and members of the Horticultural staff.

Mr. Gardner.

Courses for Graduates Only

Hort. 501, 502, 503. Methods of Horticultural Research. 3-3-3

Prerequisite: Eighteen credit hours in Horticulture.

A study of methods and procedure, outlining problems, assembling and analyzing data, and presenting results; critical review of experiment-station work. Staff.

Hort. 511, 512, 513. Seminar. 1-1-1

Required of graduate students only. Prerequisite: Eighteen credit hours in Horticulture.

Assignment of scientific articles of interest to horticulturists for review and discussion; student papers and research problems for discussion.

Mr. Gardner.

Hort. 521, 522, 523. Research. 3-5, 3-5, 3-5

Prerequisite: Eighteen credit hours in Horticulture.

Graduate students will be required to select problems for original research in fruit growing, vegetable growing or floriculture. The work and presentation of results should be of such merit as to be worthy of publication. Staff.

INDUSTRIAL ENGINEERING

Courses for Undergraduates

I. E. 101, 102, 103. Industrial Organization. 3-3-3

Required of sophomores in I. E.

Engineering methods in studies of industrial enterprises. Kimball, *Industrial Organization.* Mr. Shaw.

I. E. 201, 202, 203. Management Engineering. 3-3-3

Required of juniors in I. E. Prerequisite: I. E. 103.

Principles of management, administration, production, and sales. Executive control, industrial relations, incentives, normal capacities, standard costs, and pricing. Budgeting and planning. Guthman, *Analysis of Financial Statements.* Mr. Shaw.

Courses for Advanced Undergraduates

I. E. 301. Engineering Economics. 3-0-0 or 0-3-0 or 0-0-3

Required of seniors in E. E. and I. E. Prerequisite: Econ. 203 or 205.

Principles of investments, costs and utility with applications to engineering practice. Choice of investments and replacements. Grant, *Principles of Engineering Economy.* Mr. Shaw.

I. E. 312, 313. Industrial Engineering Problems. 0-3-3

Required of seniors in I. E. Prerequisite: or concurrent: I. E. 201, 2, 3.

Detailed study of problems of moment in this rapidly developing field. Mr. Shaw.

Courses for Graduates and Advanced Undergraduates

I. E. 402. The Electrical Industry. 0-3-0

Required of seniors in E. E. and I. E. Prerequisite: I. E. 301.

The operation, practices, management, and performance of electric light and power companies and other electrical industries. Factors, indexes, and comparisons. Services and prices. Cost analyses and pre-determinations. *Uniform System of Accounts for Electrical Utilities.* Mr. Shaw.

I. E. 412, 413. Engineering Economics Advanced. 0-3-3

Elective. Prerequisite: I. E. 301.

Comprehensive study of the application of economics to the practice of engineering. Mr. Shaw.

Elective for seniors in engineering. Prerequisite: or concurrent: I. E. 301, or senior standing.

Public utilities and their regulation. Services, rates, rate bases, and returns. Commission laws and procedure. Leading cases. Current problems. Mosher and Crawford, *Public Utility Regulation.* Mr. Shaw.

I. E. 433. Investigation and Report. 0-0-3

Required of seniors in I. E. Prerequisite: I. E. 312.
Investigation of a selected and approved problem. Mr. Shaw.

Courses for Graduates Only

I. E. 501, 502, 503. Industrial Engineering Research. 3-3-3
Prerequisite: Graduation in Engineering.
Investigation of problems of major importance in the field of Industrial Engineering. Mr. Shaw.

LANDSCAPE ARCHITECTURE

Professor: J. P. PILLSBURY
Associate Professor: G. O. RANDALL
Assistant Professor: J. G. WEAVER

General Equipment and Facilities for instruction are ample in the combined resources of the Departments of Civil and Architectural Engineering, and Horticulture.

Special Equipment and Facilities provided by the Department of Horticulture include nursery and tree-surgery tools, instruments, and supplies; drafting rooms with necessary furniture; poles, pins, and tapes for simple measurements and laying out work on the ground; planimeters and slide rules for use in making estimates; periodicals, illustrated folios, nearly six hundred lantern slides; and a first-class nucleus of a standard professional library on the subject.

Of Plant Materials, extensive collections on the College grounds and at various points in the city furnish an ample supply of all kinds for both study and use. In addition, there are several collections within easy reach for occasional visits and study.

For Design and Construction, the College grounds, private properties, and numerous public and semi-public areas and institutions in and about the city provide a wide range of subjects for study and practice. The City of Raleigh itself is a most interesting subject for study in connection with the course in City Problems, since it is one of the very few existing examples of a capital city which was planned in advance of its building.

Courses for Undergraduates

L. A. 101, 102, 103. Arboriculture. 1-1-2

Required of freshmen in Landscape Architecture; elective for other students in Agriculture.

Culture of plant materials: their planting, transplanting, training, fertilization, protection from pests; tree surgery, lawn making.
Mr. Pillsbury, Mr. Weaver.

Courses for Advanced Undergraduates

L. A. 201, 202, 203. Plant Materials: Woody Plants. 2-2-2

Required of sophomores in Landscape Architecture and juniors in Floriculture; elective for other curricula. Prerequisite: Bot. 203.

Trees, shrubs, and vines: their distribution, form and habits of growth, size, texture, color, and other characteristics determining use in planting design. Mr. Randall.

L. A. 212, 213. Theory of Landscape Design. 0-3-3

Required of sophomores in Landscape Architecture; elective for students in other curricula.

Introduction to the study of landscape design: its theoretical basis; the meaning of taste; historic styles; elements, and landscape composition; planting design, and analyses of typical problems in landscape design. Mr. Pillsbury.

L. A. 303. Plant Materials: Herbaceous Plants. 0-0-2

Required of juniors in Landscape Architecture; elective for other curricula. Prerequisite: Bot. 203.

Ornamental perennial and annual plants: height, habit of growth, texture, color, and other characteristics determining use in planting design. Mr. Randall.

L. A. 311, 312. History of Landscape Design. 3-3-0

Required of juniors in Landscape Architecture. Prerequisite: L. A. 212, 213.

History of the art of landscape design from the ages of antiquity to modern times; sketching from illustrations of design in important periods. Mr. Pillsbury.

L. A. 321, 322, 323. Landscape Design I. 4-4-4

Required of juniors in Landscape Architecture. Prerequisite: L. A. 311, 312.

Problems in presentation, and in consecutive design of small properties, gardens, and other special areas and suburban estates. Mr. Pillsbury.

L. A. 402. Ornamental Plants. 0-2-0

Required of seniors in Vegetable Gardening and Pomology; elective for juniors or seniors in other curricula. Prerequisite: Bot. 203.

Ornamental trees, shrubs, and vines; their characteristics of use in planting design for home, school, church, and community-center grounds, and farmstead landscapes. Mr. Randall.

L. A. 403. Landscape Gardening. 0-0-3

Required of seniors in Vegetable Gardening, Floriculture, and Pomology. Elective for seniors in all other curricula. Prerequisite: L. A. 402, or 201, 202, 203.

Landscape planning and planting design applied to the improvement of home, school, church, community-center grounds, and farmsteads. Practice in methods of making measured surveys, mapping, and designing improvements and planting. Mr. Pillsbury.

L. A. 411, 412, 413. Planting Design. 3-3-3

Required of seniors in Landscape Architecture. Prerequisite: L. A. 201, 202, 203, and 303.

Problems in composition with plant materials, presentation, the preparation of planting plans, and cost data. Mr. Pillsbury.

L. A. 421, 422, 423. Landscape Design II. 4-4-4

Required of seniors in Landscape Architecture. Prerequisite: L. A. 321, 322, 323.

Problems in presentation, and in the design of small parks, and other public grounds, and institutional groups. Mr. Pillsbury.

L. A. 432. City Problems. 0-3-0

Required of seniors in Landscape Architecture; elective for seniors in all schools.

Origins and types of urban communities; modern city and town planning; legal, economic, social, and æsthetic phases and their inter-relationships; fundamental data required; methods of planning and financing; zoning; city and regional planning legislation. Mr. Pillsbury.

L. A. 442. Suburban Design. 0-4-0

Prerequisite: L. A. 321, 322, 323, and 432.

The subdivision of land as related to suburban development and urban growth. Mr. Pillsbury.

L. A. 451, 452, 453. Landscape Construction. 2-2-2

Required of seniors in Landscape Architecture. Prerequisite: C. E. 224, 225, 226, and 227; and L. A. 321, 322, 323.

Problems in design of ground surface, walks, and drives; preparation of plans for grading and drainage; estimates of materials and costs, and methods of execution of landscape designs. Mr. Pillsbury.

L. A. 463. Office Practice. 0-0-1

Prerequisite: L. A. 451, 452, 453.

Arrangement of equipment, supplies, data, illustrative and other material in landscape offices; methods of professional procedure, and professional ethics. Mr. Pillsbury.

MATHEMATICS

Professor: H. A. FISHER
Graduate U. S. N. A., M.S.; *Head of the Department*

Associate Professors: H. P. WILLIAMS, B. A., M. A.
C. G. MUMFORD, B. A., M. A.
J. M. CLARKSON, B. A., M. A., Ph. D.
J. W. CELL, B. A., M. A., Ph. D.

Assistant Professors: F. A. LEE, B. A., M. A.
R. C. BULLOCK, B. A., M. A., Ph. D.
J. LEVINE, B. A., Ph. D.
L. S. WINTON, B. S., M. A., Ph. D.

Instructors: H. V. PARK, B. A., M. A.
H. M. NAHIKIAN, B. A., M. A.
D. B. THOMAS, B. S., M. S.
W. P. SEAGRAVES, B. S., M. S.

Courses for Undergraduates

***Math. 100 a-b-c. Mathematical Analysis.** 3-3-3

Math. 100-a. Fall term (Algebra).

Review of elementary topics, such as Factoring, Fractions, Simple Equations, Exponents, and Radicals. Topics then taken up are Quadratic Equations, Solution of Higher Degree Equations, Simultaneous Quadratic Equations, Logarithms, the Binomial Theorem, Arithmetic and Geometric Progressions, Permutations, Combination, and the Elementary Theory of Probability. Lee, *A Course in Mathematics for Freshmen. Part I Algebra.*

Math. 100-b. Winter term (Trigonometry).

The study of the Trigonometric Functions with their applications to the solution of the right and oblique triangles, with numerous problems. Also a brief study of Trigonometric Equations and Identities and Inverse Functions. Practical Mensurations of Solids is taken up. Lee, *A Course in Mathematics for Freshmen. Part II Trigonometry.*

Math. 100-c. Spring term (Mathematics of Finance).

The principal topics are Simple and Compound Interest, Annuities, Sinking Funds and Amortization, and the Valuation of Bonds and other applications. Lee, *A Coure in Mathematics for Freshmen. Part III Mathematics of Finance.* Staff.

* This course will be repeated the following term.

***Math. 101. Algebra.** 6-0-0

Required of freshmen in the Schools of Engineering and Textile, and in the departments of Industrial Management, Industrial Arts, and Landscape Architecture.

This course includes quadratic equations, the progressions, the binomial theorem, permutations and combinations, logarithms, the general theory of equations, the solution of higher equations, determinants and partial fractions. Fisher, *College Algebra.* Staff.

* This course will be repeated the following term.

***Math. 102. Trigonometry.** 0-6-0

Required of freshmen in the Schools of Engineering and Textile, and in the departments of Industrial Management, Industrial Arts, and Landscape Architecture.

The trigonometric functions, derivation of formulae, the solution of plane and spherical triangles, with practical applications. Clarkson and Bullock, *Plane and Spherical Trigonometry.* Staff.

***Math. 103. Analytical Geometry.** 0-0-6

Required of freshmen in the School of Engineering and in the Departments of Industrial Management, Industrial Arts, and Landscape Architecture.

Prerequisite: Math. 101, 102.

Loci of equations, the straight line, circle, parabola, ellipse, hyperbola, the general equation of the second degree, polar coördinates, transcendental curves, parametric equations, coördinates in space, planes and surfaces. Smith, Gale and Neelley, *Elements of Analytical Geometry.* Staff.

***Math. 201. Differential Calculus.** 4-0-0

Required of sophomores in Engineering. Prerequisite: Math. 103.

An elementary course in the fundamental principles of the Calculus, including the formula for differentiation, with applications to Geometry and to problems in rates, maxima and minima, curve tracing, and curvature. Granville, Smith, Longley, *Elements of the Differential and Integral Calculus.* Staff.

***Math. 202. Integral Calculus I.** 0-4-0

Required of all sophomores in Engineering. Prerequisite: Math. 201.

Methods of integration, and the study of the definite integral, with applications to problems in areas, volumes, surfaces, and lengths of arcs. Granville, Smith, Longley, *Elements of the Differential and Integral Calculus.* Staff.

* This course will be repeated the following term.

***Math. 203. Integral Calculus II.** 0-0-4

Required of sophomores in Engineering. Prerequisite: Math. 202.

A continuation of Integral Calculus I: the calculation of centroids, radii of gyration and moments of inertia; problems in work and liquid pressure; double and triple integrals, infinite series, hyperbolic functions, and the elements of ordinary differential equations. Granville, Smith, Longley, *Elements of the Differential and Integral Calculus.* Staff.

Courses for Graduates and Advanced Undergraduates

Math. 301-a. Differential Equations. 3-0-0

Required of juniors in Electrical Engineering and elective for others. Prerequisite: Math. 203.

A short course to include the solution of standard types of equations. Numerous examples in the field of Electrical Engineering will be studied. Phillips, *Differential Equations.* Mr. Bullock.

Math. 301-b. Differential Equations. 3-0-0

Elective. Principally for students in Chemical Engineering. Prerequisite: Math. 203.

A study of the equations that occur in Applied Chemistry. Much emphasis on graphic methods and numerical work. Hitchcock and Robinson, *Differential Equations in Applied Chemistry.* Mr. Winton.

Math. 402. Graphical and Numerical Methods. 0-3-0

Elective. Prerequisite: Math. 301 (a or b).

Graphical and numerical approximate methods in differentiation, integration, and the solution of both ordinary and differential equations. Theory of least squares and empirical curve fitting. Numerous examples in the fields of physics, electricity, mechanics, and engineering will be solved. Lipka, *Graphical and Mechanical Computation.* Mr. Cell.

Math. 403. Vector Analysis I. 0-0-3

Elective. Prerequisite: Math. 301 (a or b).

A study of the different vector products. The calculus of vectors with applications to geometry and mechanics. Phillips, *Vector Analysis.* Mr. Clarkson.

Math. 411. Advanced Calculus for Engineers, I. 3-0-0

Elective. Prerequisite: Math. 301-a or 301-b.

Functions, power series, partial differentiation, maxima and minima of functions of two variables. Woods, *Advanced Calculus.* Mr. Levine.

* This course will be repeated the following term.

Math. 412. Advanced Calculus for Engineers, II. 0-3-0

A continuation of Math. 411.

The definite integral, special integrals, line integrals, special differential equations. Woods, *Advanced Calculus.* Mr. Levine.

Math. 413. Advanced Calculus for Engineers, III. 0-0-3

A continuation of Math. 412.

Partial differential equations, special topics in vector analysis, functions of a complex variable, elliptic integrals. Woods, *Advanced Calculus.* Mr. Levine.

Math. 421. Advanced Analytical Geometry. 3-0-0

Elective. Prerequisite: Math. 301 (a or b).

The elements of higher plane curves and the geometry of space. Snyder and Sisam, *Analytical Geometry.* Mr. Bullock.

Math. 422. Theory of Equations. 0-3-0

Elective. Prerequisite: Math. 301 (a or b).

The usual topics in the theory of equations, the solution of higher equations, exponential equations, logarithmic equations, and determinants. Dickson, *First Course in Theory of Equations.* Mr. Mumford.

Math. 423. Series. 0-0-3

Elective. Prerequisite: Math. 301 (a or b).

Fourier series, related series and functions, with applications to physics and engineering. Mr. Levine.

Courses for Graduates Only

Math. 501. Applied Mathematics I. 3-0-0

Elective. For graduate students only. Prerequisite: Math. 413, or the consent of the instructor.

The course will be arranged to fit the engineering interests of the students enrolled.

Catenary cables, straight and curved beam problems, theory of curve fitting, probability and applications, problems in the theory of elasticity, ballistics, vibration theory and problems, electrical circuits, Heaviside operational calculus and applications to electrical engineering and to other engineering problems, calculus of finite differences and applications. Doherty and Keller, *Mathematics of Modern Engineering.* Mr. Cell

Math. 502. Applied Mathematics II. 0-3-0

Elective. For graduate students only. Prerequisite: Math. 501.
A continuation of Math. 401. Doherty and Keller, *Mathematics of Modern Engineering.* Mr. Cell.

Math. 503. Applied Mathematics III. 0-0-3

Elective. For graduate students only. Prerequisite: Math. 502.
A continuation of Math. 402. Doherty and Keller, *Mathematics of Modern Engineering.* Mr. Cell.

MECHANICAL ENGINEERING

Courses for Undergraduates

M. E. 101, 102, 103. Engineering Drawing I. 2-2-2

Required of freshmen in Textiles.
Drawing-board work covering lettering, projections, sections, pictorial drawings, working drawings as related to textile machinery, tracing, and blueprinting. Hoelscher and Mays, *Basic Units in Mechanical Drawing.*
Messrs. Briggs, Brown, Adams, Moose, and Nash.

M. E. 105, 106. Engineering Drawing II. 3-3-0

Required of freshmen in Engineering, Agricultural Engineering, Teachers of Industrial Arts, and Landscape Architecture.
Drawing-board work covering lettering, projections, sections, revolution, pictorial drawings, intersection, development, working drawings, tracing, and blueprinting. French, *Engineering Drawing.*
Messrs. Briggs, Brown, Sanford, Moose, Nash, and Adams.

M. E. 107. Descriptive Geometry. 0-0-3

Required of freshmen in Engineering, Agricultural Engineering, Teachers of Industrial Arts, and Landscape Architecture. Prerequisite: M. E. 105, 106.
Representation of geometrical magnitudes by means of points, lines, planes, and solids, and the solutions of problems. Warner, *Applied Descriptive Geometry.* Messrs. Briggs, Brown, Adams, Moose and Nash.

M. E. 121, 122, 123. Shopwork. 1-1-1

Required of sophomores in Chemical Engineering and freshmen in Textiles. First two terms required of juniors in Farm Bus. Adm.
Use of bench tools, making cabinet joints, operation and care of woodworking machinery. Correct methods of staining, varnishing, filling, and gluing various kinds of wood. The forging of iron and steel. Instruction and practice in molding and core making. Cupola practice.
Messrs. Maddison, Rowland, and Cope.

M. E. 124. Shopwork. 2 or 2 or 2

Required of sophomores in Mechanical Engineering and in Industrial Engineering.

Deal with elementary joinery, finishing, theory of dry-kilning, wood-turning. Lectures, demonstrations, and practice in hand work and machine methods. Typical patterns and core boxes are constructed such as solid, split, and loose piece. Turner and Town, *Pattern Making.*

Mr. Rowland.

M. E. 125. Shopwork. 2 or 2 or 2

Required of sophomores in Industrial and Mechanical Engineering.

Lectures, demonstrations, and practice in molding and core making, furnace operations, melting and casting of ferrous and non-ferrous metals and their alloys. Instructions and practice in the testing of molding sands. Stimpson, Gray, and Grennan, *Foundry Work.* Mr. Madison.

M. E. 126. Shopwork. 2 or 2 or 2

Required of sophomores in Industrial and Mechanical Engineering.

A study of the principles and practice as applied to the forging of wrought iron and steel. Lectures, demonstrations, and practice in forge welding. Tool-making and heat treatment. Bacon, Johnson, *Forging.* Mr. Cope.

M. E. 127. Woodworking. 0-3-0

Required of juniors in Architectural Engineering.

Includes elementary joinery, cabinet joints, reading blueprints, and wood-turning. Theory of dry-kilning and wood finishing. Lectures, demonstrations, and practice in hand and machine methods. Mr. Rowland.

M. E. 128. Metal Work. 3 or 3 or 3

Required of sophomores in Electrical Engineering.

A study of the principles and practices as applied to the forging of wrought iron and steel. Lectures, demonstrations, and practice in forge welding. Tool making and heat treatment. Mr. Cope.

M. E. 201, 202. Heat Engineering I. 3-3-0

Elective in Textile Manufacturing. Prerequisite: Phys. 103 and Math. 103.

Nature and measurement of heat, work, and power. Study of fuels and combustion, steam and steam boilers, and boiler-room auxiliaries. Elementary thermodynamics of the steam cycle. Potter and Calderwood, *Elements of Steam and Gas Power Engineering.* Mr. Bridges.

M. E. 211, 212, 213. Mechanical Drawing. 2-2-2 or 0-2-2

Six (6) credits required of sophomores in Mechanical Engineering, juniors in teachers of Industrial Ed. and four (4) credits required of juniors in Ceramic Engineering. Prerequisite: M. E. 105-6, M. E. 107.

Drawing-board work covering machine fastenings, pipe fittings, cam design, technical sketching, applied descriptive geometry, and working drawings; tracing and blueprinting. French, *Engineering Drawing.*

Messrs. Briggs, Fornes, and Satterfield.

M. E. 215, 216, 217. Elementary Mechanism. 1-1-1

Required of juniors in Electrical Engineering. Prerequisite: M. E. 105-6-7.

Instruction in elementary cams, machine fastenings, technical sketching, working drawings, simple link work, and design of simple machine parts. Slaymaker, *Elementary Mechanism.* Messrs. Briggs and Fornes.

M. E. 221, 222, 223. Metallurgy. 2-2-2

Required of sophomores in Mechanical Engineering. Prerequisite: Chem. 101-2-3.

The study of metals and alloys; smelting, refining, shaping, and heat treating. Crystallography of metals, their properties and commercial applications. Stoughton and Butts, Engineering Metallurgy.

Mr. Selkinghaus.

M. E. 225, 226. Machine Shop I. 1-1-0

Required of juniors in Chemical Engineering. Prerequisite: M. E. 121-22-23.

Instruction is given in chipping, filing, scraping, and babbitting. General machine work, including straight and taper turning, drilling, shaper work, and gear cutting. Mr. Wheeler.

M. E. 227, 228, 229. Machine Shop II. 1-1-1

Required of juniors in Mechanical Engineering and Yarn Manufacturing. Prerequisite: M. E. 121-22-23, or M. E. 124-25-26.

Given by lectures and demonstrations. Includes laying out work, grinding tools, chipping, drilling, tapping, babbitting bearings and scraping. Machine work, including centering, straight and taper turning, chucking, screw cutting, shaper work, planer work and index milling, and gear cutting. Turner, *Machine Tool Work.* Mr. Wheeler.

M. E. 231, 232, 233. Machine Shop III. 2-2-2

Required of juniors in Industrial Engineering. Prerequisite: M. E. 124-25-26.

Instruction is given through lectures, demonstrations and required exercises. The exercises will include chipping, tapping, drilling and tool grinding. Machine tool work will include straight and taper turning, screw-cutting, shaper and planer work, index milling and gear cutting. Emphasis placed upon economic production. Turner, *Machine Tool Work.*

Mr. Wheeler.

M. E. 235, 236. Metal Shop. 3-3-0

Required in Industrial Arts. Prerequisite: Ed. 106.

Use of hand and machine tools in problems for Secondary Schools. Kaup, *Machine Shop Practice.* Mr. Wheeler.

M. E. 237, 238, 239. Furniture Designs and Rod-Making. 3-3-3

Required of juniors in M. E. (Furniture Option). Prerequisite: M. E. 105, 106, and 107; 124-25-26.

Principles of elementary freehand design. Methods of dry-kilning, finishing, filling and staining, and rod-making. Dean, *Modern American Period Furniture.* Mr. Wheeler.

M. E. 250. General Aeronautics. 3 or 3 or 3

Elective. Prerequisite: Math. 101-2-3.

Ground-School course for those students wishing to receive flight training under Civil Aeronautics Authority program. The scope of the course embraces Civil Air Regulations, Navigation, and Meteorology as required for a pilot's certificate. Lusk: *General Aeronautics.* Mr. Parkinson.

M. E. 301, 302. Heat Engineering II. 3-3-0

Required of juniors in Ceramic and seniors in Chemical Engineering.

Prerequisite: Phys. 201-2-3, Math. 203, M. E. 105-6.

Nature and measurement of heat, work, and power. Study of fuels and combustion, steam and steam boilers, and boiler-room auxiliaries. Elementary thermodynamics of steam and gas engine. Young and Young, *Elementary Engineering Thermodynamics.*

Mr. Selkinghaus, Mr. Groseclose.

M. E. 303. Heat Engineering III. 0-0-3

Required of juniors in Civil, Geological, and Highway Engineering.

Prerequisite: Phys. 201-2-3, Math. 101-2-3.

Nature and measurement of heat, work, and power. Study of fuels and combustion, steam and steam boilers, and boiler-room auxiliaries. A. M. Greene, Jr., *Elements of Power Generation.*

Messrs. Bridges and Selkinghaus.

M. E. 307, 308, 309. Engineering Thermodynamics. 3-3-3

Required of juniors in E. E., M. E., and I. E.

Prerequisite: Phys. 201-2-3, Math. 203.

The study of heat as an engineering media, using the energy equation to solve problems dealing with gases, vapors, and mixtures. The steam table is studied in detail, with special application to the design of nozzles, steam power plants, engines and turbines. Combustion, refrigeration, compressed air, and internal combustion engine cycles are also studied. Kiefer and Stuart, *Principles of Engineering Thermodynamics.*

Messrs. Hoefer, Rice, Satterfield, and Vaughan.

M. E. 311, 312. Mechanical Engineering Laboratory I. 1-1-0

Required of juniors in Cer. Engineering. Concurrent with M. E. 301-2.

Calibration of thermometers and gauges, use of planimeters and indicators; coal and gas analyses; tests of lubricating oils. Testing of steam engines, turbines, and internal combustion engines. Rice, *Mechanical Engineering Laboratory.* Messrs. Bridges, Groseclose, Rice, and Selkinhaus.

M. E. 313, 314, 315. Mechanical Engineering Laboratory II. 1-1-1

Required of juniors in Electrical, Industrial, and Mechanical Engineering. Concurrent with M. E. 307, 308, 309, or M. E. 301, 302.

The work consists of: calibration of pressure, temperature, speed and power measuring instruments; the study of steam generating and power generating equipment; the testing of fuels, lubricants, and power machinery. Rice, *Mechanical Engineering Laboratory.*

Messrs. Bridges, Groseclose, Rice, Sanford, and Selkinghaus.

M. E. 317, 318, 319. Kinematics. 3-3-3

Required of juniors in Mechanical Engineering. Prerequisite: M. E. 211-12-13.

A study of the science of the motion of machine parts, or the geometry of machinery, with emphasis on belts, pulleys, cams, gears, chain drives, shafts, and links. Schwamb, Merrill, and James, *Elements of Mechanism.*

Mr. Fornes.

M. E. 323. Introduction to Aeronautics. 0-0-3

Required of juniors in M. E., Aeronautical Option. Prerequisite: Phys. 201-2-3.

A study of the airplane and simple aerodynamics. Carter, *Simple Aerodynamics and the Airplane.* Mr. Parkinson.

M. E. 341, 342, 343. Furniture Design and Construction. 3-3-6

Required of seniors in Mechanical Engineering (Furniture Option). Prerequisite: M. E. 237-38-39.

Theory and practice in construction and finishing. Factory processes and layout for quantity production. Dean, *Modern American Period Furniture.* Mr. Wheeler.

Courses for Graduates and Advanced Undergraduates

M. E. 401, 402, 403. Power Plants. 3-3-3

Required of seniors in Mechanical Engineering. Prerequisite: M. E. 307-8-9 and M. E. 313-14-15.

A critical study of fuels and combustion, heat balance, steam boilers, prime movers and auxiliaries as applied to power generation. Morse, *Power Plant Engineering and Design.* Mr. Hoefer, Mr. Vaughan.

M. E. 404. Heating and Air-Conditioning. 0-3-0

Required of seniors in Mechanical Engineering and Industrial Management. Prerequisite: M. E. 307-8-9.

Principles of heating and ventilation. Hot air, steam, and hot water heating system; air conditioning. Severns, *Heating, Ventilating, and Air Conditioning Fundamentals.* Mr. Vaughan.

M. E. 405. Refrigeration. 0-0-3

Required of seniors in Mechanical Engineering. Prerequisite: M. E. 307-8-9.

Theory of refrigeration; types of ice-making and refrigerating machinery. Special emphasis upon cooling for air conditioning. Installation, management, and cost of operation. Macintire, *Refrigeration Engineering.* Mr. Vaughan.

M. E. 407, 408, 409. Mechanical Engineering Laboratory III. 1-1-1

Required of seniors in Mechanical Engineering. Prerequisite: M. E. 313-14-15.

Testing of materials, efficiency, and economy runs on gasoline, oils, and steam engines, steam turbine and fans. Boiler and steam pump tests. Hydraulic testing. Rice, *Mechanical Engineering Laboratory.* Messrs. Bridges, Groseclose, Rice, and Selkinghaus.

M. E. 411, 412, 413. Machine Design. 3-3-3

Required of seniors in Mechanical Engineering. Prerequisite: M. E. 317-18-19, E. M. 213, E. M. 222.

Application of mechanics, kinematics, strength of materials, and metallurgy to the design of machinery. Determination of proper materials, shape, size, strength, motion, and relationship of various machine parts. Kimball and Barr, *Machine Design.* Mr. Fornes.

M. E. 415. Hydraulic Machinery. 0-0-3

Required of seniors in Electrical Engineering. Prerequisite: E. M. 230.

Design and testing of hydraulic motors and pumps, including study of their theoretical and actual efficiencies. Naval Hydro-Mechanics, Laboratory Experiment. Russell, *Hydraulics.* Mr. Riddick.

M. E. 417, 418, 419. Aerodynamics. 3-3-3

Required of seniors taking Aeronautical Option in Mechanical Engineering. Prerequisite: Math. 203 and M. E. 323.

A study of forces affecting the airplane under the various conditions of flight. Diehl, *Engineering Aerodynamics.* Mr. Parkinson.

M. E. 421, 422, 423. Aircraft Engines. 3-3-3

Required of seniors taking Aeronautical Option in Mechanical Engineering. Prerequisite: M. E. 307-08-09.

Thermal and mechanical characteristic of high-speed internal combustion engines; operation, performance, and design. Streeter and Lichty, *Internal Combustion Engines.* Mr. Rice.

M. E. 425, 426, 427. Airplane Design. 3-3-3

Required of seniors taking Aeronautical Option in Mechanical Engineering. Prerequisite: E. M. 213, 222, C. E. 321 and M. E. 323.

A study of the design and construction of aircraft. Niles and Newell, *Airplane Design*; Younger, *Design of Metal Airplanes.* Mr. Sanford.

M. E. 431, 432, 433. Aeronautical Laboratory. 1-1-1

Required of seniors taking Aeronautical Option in Mechanical Engineering. Prerequisite: M. E. 313-14-15.

Experiments with aircraft engines and auxiliaries. Wind-tunnel tests on airfoils and models. Rigging of airplanes. Rice, *Mechanical Engineering Laboratory.* Mr. Rice, Mr. Sanford.

M. E. 435, 436, 437. Experimental Engineering. 3-3-3

Prerequisite: M. E. 313-14-15, or equivalent as approved by faculty group.

A course in advanced engineering principles applied to a specific project dealing with heat-power, hydraulics, metallography, aerodynamics, or general experimental work. A seminar period is provided and a written report required. Messrs. Parkinson, Rice, Vaughan, and Wheeler.

M. E. 441. Aircraft Instruments and Avigation. 3-0-0

Prerequisite: M. E. 323.

This course deals with the instruments used in aircraft engine operation, flight indication, and in avigation. The uses, principle of operation, and calibration is studied in detail. The fundamental of avigation includes problems in avigation such as course plotting, radius of action from fixed and moving bases and interception. *Lecturer's Notes.* Mr. Parkinson.

M. E. 442. Air Transportation. 0-3-0

Prerequisite: M. E. 323.

The various phases of air transportation and airline operation studied in this course. This includes a brief survey of existing conditions, factors governing development, methods of large scale aircraft operation, personnel organization and aviation law. *Lecturer's Notes.* Mr. Parkinson.

M. E. 443. Aircraft Propeller Design. 0-0-3

Prerequisite: M. E. 323.

The various theories are discussed in this design course. This embraces effect of blade shape, tip speed, and gearing on propeller performance. The various types of propellers are studied in detail. Weick, *Aircraft Propeller Design.* Mr. Parkinson.

Courses for Graduates Only

M. E. 501. Advanced Engineering Thermodynamics. 3-0-0

Prerequisite: M. E. 307-8-9 and M. E. 407-8-9.

A further development of the thermodynamic equations and their application to advanced engineering problem. Mr. Hoefer, Mr. Rice.

M. E. 505, 506, 507. Internal Combustion Engine Design. 3-3-3

Prerequisite: M. E. 421-22-23 and 407-8-9.

A thorough study of the field of Internal Combustion Engines together with the design of an engine to meet specific requirements. Pye: "Internal Combustion Engines" Vol. I and II. Mr. Rice.

***M. E. 513, 514, 515. Power Plant Design.** 3-3-3

Prerequisite: M. E. 401-2-3 and M. E. 307-8-9.

The design of a plant to fulfill conditions obtained by investigation and research; specifications for design and installation.

Mr. Hoefer, Mr. Vaughan.

***M. E. 517, 518, 519. Design of Heating and Ventilating System.** 3-3-3

Prerequisite: M. E. 404 and M. E. 407-8-9.

The study and the design of a heating system for specific conditions; specifications for installation and performance tests of heating equipment.

Mr. Rice, Mr. Vaughan.

M. E. 521, 522, 523. Mechanical Engineering Research. 3-3-3

Prerequisite: M. E. 401-2-3 and M. E. 404.

Research and thesis in connection with M. E. 513-14-15 and M. E. 517-18-19. Mr. Rice, Mr. Vaughan.

M. E. 525, 526, 527. Advanced Aerodynamics. 3-3-3

Prerequisite: M. E. 417-18-19.

Wind-tunnel research. First term: a study of tests performed. Second term; a series of experiments. Third term: the compilation and interpretation of the results. Mr. Parkinson.

M. E. 531, 532, 533. Aerodynamic Research. 3-3-3

Prerequisite: M. E. 431-32-33.

Research and thesis in connection with M. E. 411-12-13. Mr. Parkinson.

* Only one of these courses to be offered during any College year.

MILITARY SCIENCE AND TACTICS

Mil. 101, 102, 103. Military Science I. 2-2-2

This, the first-year basic course, is required of all physically fit freshmen.

The National Defense Act and the R. O. T. C., Military Courtesy and Discipline, Military Hygiene and First Aid, Leadership, Rifle Marksmanship, Map Reading, Military Organization, Current International Situation, Military History and Policy, and Obligations of Citizenship.

Mil. 201, 202, 203. Military Science II. 2-2-2

This, the second-year basic course, is required of all physically fit sophomores who have completed Military Science 101.

Leadership, Musketry, Automatic Rifle, Scouting and Patrolling, Combat Principles of the Rifle Squad and Section; Interior Guard Duty and Military History.

Mil. 301, 302, 303. Military Science III. 3-3-3

Prerequisite: Ms. II.

This, the first-year advanced course, is elective for selected juniors. Pre-Aerial Photograph Reading, Leadership, Machine Gun, 37 MM. Gun, Three-inch Trench Mortar, Combat Principles of the Rifle Section and Rifle Platoon, Supply and Mess Management, Care of Animals and Stable Management, Field Fortifications, Care and Operation of Motor Vehicles, and Defense Against Chemical Warfare.

Mil. 401, 402, 403. Military Science IV. 3-3-3

This, the second year advanced course, is required of all seniors who have completed the first-year advanced course. Prerequisite: Ms. III.

Military Law and Officers Reserve Corps Regulations, Military History and Policy, Anti-aircraft Defense, Leadership, Combat Principles of the Rifle Company, Machine Gun Company, and Howitzer Platoon, Tanks and Mechanization, Combat Intelligence, and Signal Communications.

Full credit will be given for work at other institutions maintaining a *Senior* unit of the Reserve Officers Training Corps as shown by the students' record, Form 131 A. G. O., kept by the Professor of Military Science and Tactics.

MODERN LANGUAGES

Professor: L. F. HINKLE, *Head of the Department*
Assistant Professor: S. T. BALLENGER
Instructor: I. O. GARODNICK

Purposes.—Work in the Department of Modern Languages is designed primarily to meet the following objectives, viz: (1) the acquisition of a reading ability sufficient to enable the student to read and appreciate the foreign literature covering his special field of science or technology and (2) the attainment of an appreciation of the cultural background and contributions of the civilizations whose languages are studied. With these objectives in view the courses are arranged as (1) Basic, (2) Technical and Scientific, and (3) General. The basic, technical and scientific courses are essentially linguistic in content, while the general courses are broadly cultural.

Translation Service.—A special feature of the work of the department is that of the Translation Service. This work is conducted as an aid to research, on the one hand, and a means to the acquisition of a reading knowledge of the respective language, on the other. Through this service advanced undergraduate students and graduate students are given the opportunity of working a translation project in connection with their subject of major interest. When such project is satisfactorily completed, it is accepted in lieu of an examination as evidence of reading ability. This proce-

dure is recommended as the preferable method of preparation for the acquisition of a reading knowledge of the language concerned. Revised copies of these projects are deposited in our local library and made available to investigators in other institutions through the medium of the American Documentation Institute.

Basic Courses

***M. L. 101, 102. Elementary French.** 3-3-0

This course consists of a series of lectures on the structure, diction, pronunciation, and other matters of technique of the French language, supplemented by easy readings and translations. No previous training in the language is necessary. Individual reports and conferences are required.
Mr. Ballenger, Mr. Garodnick.

***M. L. 201. Elementary French Prose.** 0-0-3

Prerequisite: M. L. 101-102 or Equivalent.
This course consists of reading and translation of easy French, lectures on the structure of the French language, diction, and pronunciation. The work is conducted in such manner that the student's choice in reading material is a matter of individual need. Individual reports and conferences are required. Mr. Ballenger.

M. L. 202. Intermediate French Prose. 3-0-0

Prerequisite: M. L. 201 or Equivalent. (1)
This course is based upon a study of prose reading material which is largely historical in nature. Attention is given to the acquisition and extension of the student's basic vocabulary. Individual translation, parallel readings, and reports are required. Mr. Ballenger.

M. L. 103, 104. Elementary German. 3-3-0

This course consists of a series of lectures on the structure and technique of the German language, supplemented by a series of easy readings and translations. No previous training in the language is necessary. Individual reports and conferences are required. Dr. Hinkle, Mr. Garodnick.

***M. L. 203. Elementary German Prose.** 0-0-3

Prerequisite: M. L. 103-104 or Equivalent.
This course consists of reading and translation of easy German, supplemented with lectures on the structure and idiom of the German language. The work is conducted in such a manner that the student's choice of reading material is a matter of individual need. Individual reports and conferences are required. Dr. Hinkle.

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* Two years of high-school work will ordinarily be considered the equivalent of M. L. 101-102, and 201; and of 103, 104, and 203.

M. L. 204. Intermediate German Prose. 3-0-0

Prerequisite: M. L. 203 or Equivalent. (1)

This course is based upon a study of prose reading material which is largely historical in nature. Attention is given to the acquisition and extension of the student's basic vocabulary. Individual translations, parallel readings, and reports are required. Dr. Hinkle.

***M. L. 105-106. Elementary Spanish.** 3-3-0

This course consists of a series of lectures on the structure, diction, pronunciation, and other matters of technique of the Spanish language, supplemented by easy readings, and translations. No previous training in the language is necessary. Individual reports and conferences are required. Mr. Ballenger, Mr. Garodnick.

***M. L. 205. Elementary Spanish Prose.** 0-0-3

Prerequisite: M. L. 105-106 or Equivalent.

This course consists of reading and translation of easy Spanish, lectures on the structure of the language, diction and pronunciation. The work is conducted in such a way that the student's choice of reading material is a matter of individual need. Individual reports and conferences are required. Mr. Ballenger.

M. L. 206. Intermediate Spanish Prose. 3-0-0

Prerequisite: M. L. 105, 106, and 205 or Equivalent. (1)

This course is based upon a study of prose reading material which is largely historical in nature. Attention is given to the acquisition and extension of the student's basic vocabulary. Individual translations, parallel readings, and reports are required. Mr. Ballenger.

Technical and Scientific Courses

M. L. 301. Technical French. 0-3-0

Prerequisite: M. L. 202 or Equivalent.

This course consists of a series of readings and translations of relatively simple technical French, supplemented by lectures on technical terminology, vocabulary analysis, and other matters of linguistic technique. The work is designed to meet the needs of students whose interest in the language is primarily that of the acquisition of a reading ability. Since the choice of reading material is adjusted to individual needs, it may be taken by students of varying degrees of previous linguistic training. Mr. Ballenger.

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* Two years of high-school work will ordinarily be considered the equivalent of M. L. 105, 106, and 205.

M. L. 302. Introductory Scientific French. 0-0-3

Prerequisite: M. L. 202 or Equivalent.

This course is based upon a study of scientific French of intermediate difficulty, supplemented with lectures on scientific terminology and other matters of linguistic technique. The needs of students whose interest is that of the acquisition of a reading knowledge of the language is constantly kept in view. The basic techniques of translation are explained and demonstrated by means of personal conferences. Mr. Ballenger, Mr. Garodnick.

M. L. 401, 402, 403. Advanced Scientific French. 3-3-3

Prerequisite: M. L. 301, or 302, or equivalent.

This course is based upon a study of French scientific literature appearing in current bulletins, magazines and technical journals. Students are given the opportunity of working a translation project in connection with their subject of major interest. Special attention is given to the comprehension of the thought of the article under consideration and its accurate rendition into English. Parallel readings, reports, and conferences are required. Dr. Hinkle, Mr. Garodnick.

M. L. 303. Technical German. 0-3-0

Prerequisite M. L. 204, or Equivalent.

This course consists of a series of readings and translations of relatively simple technical German, supplemented by lectures on technical terminology, word order, vocabulary analysis and other matters of linguistic technique. The work is designed to meet the needs of students whose interest in the language is primarily that of the acquisition of a reading ability. Since the choice of reading material is adjusted to individual needs, it may be taken by students of varying degrees of previous linguistic training.

Dr. Hinkle.

M. L. 304. Introductory Scientific German. 0-0-3

Prerequisite: M. L. 204, or Equivalent.

This course is based upon a study of scientific German of intermediate difficulty supplement with lectures on scientific terminology and other matters of linguistic technique. The needs of students whose interest is that of the acquisition of a reading knowledge of the language is constantly kept in view. The basic techniques of translation are explained and demonstrated by means of personal conferences. Mr. Hinkle, Mr. Garodnick.

M. L. 404, 405, 406. Advanced Scientific German. 3-3-3

Prerequisite: M. L. 303, or 304, or Equivalent.

This course is based upon a study of German scientific literature appearing in current bulletins, magazines, and technical journals. Students are given the opportunity of working a translation project in connection with their subject of major interest. Special attention is given to the comprehension of the thought of the article under consideration and its accurate rendition into English. Parallel readings, reports, and conferences are required. Dr. Hinkle, Mr. Garodnick.

M. L. 305. Technical and Industrial Spanish. 0-3-0

Prerequisite: M. L. 206, or Equivalent.

This course consists of a study of technical and industrial literature. Particular attention is given to the special terminology characteristic of such literature with a view to the acquisition of a practical vocabulary. Individual conferences and reports are required. Mr. Ballenger.

M. L. 306. Introductory Scientific Spanish. 0-0-3

Prerequisite: M. L. 206, or Equivalent.

This course consists of a series of readings and translations of relatively simple scientific Spanish, supplemented by lectures on scientific terminology, vocabulary analysis, and other matters of linguistic technique. The work is designed to meet the needs of students whose interest in the language is primarily that of the acquisition of a reading ability. Since the choice of reading material is adjusted to individual needs, it may be taken by students of varying degrees of previous linguistic training.

Mr. Ballenger.

M. L. 407, 408, 409. Advanced Scientific Spanish. 3-3-3

Prerequisite: M. L. 305, or 306, or Equivalent.

This course is based upon a study of Spanish scientific literature appearing in current bulletins, magazines, and technical journals. Students are given the opportunity of working a translation project in connection with their subject of major interest. Special attention is given to the comprehension of the thought of the article under consideration and its accurate rendition into English. Parallel readings, reports, and conferences are required. Mr. Ballenger, Mr. Garodnick.

General Courses

M. L. 410. Masterpieces of French Literature. 3-0-0

Prerequisite: Junior or Senior Standing.

This course consists of a study of outstanding masterpieces of French literature. It is conducted in such a manner as to give a brief outline of French literary development. Parallel reading may be done either in translation or in French. An open elective. No language prerequisites.

Dr. Hinkle.

M. L. 411. Masterpieces of German Literature. 0-3-0

Prerequisite: Junior or Senior Standing.

This course consists of a study of outstanding masterpieces of German literature. It is conducted in such a manner as to give a brief outline of German literary development. Parallel readings may be done either in translation or in German. An open elective. No language prerequisites.

Dr. Hinkle.

M. L. 412. Masterpieces of Spanish Literature. 0-0-3

Prerequisite: Junior or Senior Standing.

This course consists of a study of outstanding masterpieces of Spanish literature. It is conducted in such a manner as to give a brief outline of Spanish literary development. Parallel readings may be done either in translation or in Spanish. An open elective. No language prerequisites.

Dr. Hinkle.

M. L. 413. French, German and Spanish Civilization. 3-0-0

Prerequisite: Junior or Senior Standing.

This is a course dealing with the development of French, German, and Spanish civilizations. The reading material is supplemented by lectures and reports on the manners and customs of the respective culture under consideration. Topics, such as racial stocks, people, social classes, governments, politics and education are given special consideration. Parallel readings, reports, and conferences are required. An open elective. No language prerequisites. Dr. Hinkle.

M. L. 414. The Development of Language. 0-3-0

Prerequisite: Junior or Senior standing.

This is a course covering the various phases of linguistic growth, with the object of providing a basis for intelligent language appreciation. Problems as to the origin of language, linguistic change, grammatical categories, dialects, standard language, word order, inflection, isolation, agglutination, etymology, and other linguistic processes are given special consideration. Parallel readings, reports, and conferences are required. An open elective. No language prerequisites. Dr. Hinkle.

M. L. 415. Masterpieces of Foreign Literature. 0-0-3

Prerequisite: Junior or Senior Standing.

This course consists of a study of outstanding literary productions in each of the various types of literature, and lectures on the cultural background out of which they have developed. It is designed primarily to meet the needs of students who wish to supplement their knowledge of their own literature with a survey of similar contributions in the literature of other civilizations. Special attention is given to the literary monuments of France, Germany, Spain, and Italy. Since the material studied is done in translation, no foreign language prerequisites are necessary. Daily reports and conferences are required. Dr. Hinkle.

PHYSICAL EDUCATION AND ATHLETICS

Professor and Head: J. F. MILLER
Business Manager of Athletics: J. L. VON GLAHN

Technical Assistants in Activities

Physical Education: MILLER, SERMON, DOAK, WARREN, and WALLER
Intramural: MILLER, DOAK
Football: NEWTON, WARREN, HICKMAN, WALLER
Basketball: SERMON, WARREN
Baseball: DOAK, WALLER
Track: SERMON, HICKMAN
Swimming: LEFORT, KURFEHS
Tennis: GREENE, SEEGERS
Wrestling: HICKMAN
Boxing: REGDON
Golf: NEWTON

Purpose.—The physical training courses are so standardized that they are presented, instruction given, and examination required of each individual student on the same basis as all other college courses. Students having physical defects which would interfere with their meeting the regular class requirements are placed in a restricted group activity.

Organization.—In general, physical training activities fall in one of three groups: (a) those developing individual physical efficiency, (b) those affording combative contests, (c) those occupying recreative or leisure time. Work for the most part is prescribed for freshmen, while election of activities is permitted sophomores.

Courses and Activities

P. E. 101, 102, 103. Fundamental Activities and Hygiene. 1-1-1

Required of all freshmen except those excused on the recommendation of the college physician.

Individual health and physical efficiency of each student based on standardized athletic, gymnastic and efficiency tests. Lectures on personal hygiene required in one term only. Mr. Miller and Staff.

P. E. 201, 202, 203. Sports Activities. 1-1-1

Required of all sophomores except those excused upon recommendation of college physician. Prerequisite: P. E. 101-2-3.

Election is permitted in popular sports for healthful exercise and a fair degree of skill in them. Mr. Miller and Staff

P. E. 111, 112, 113. Restricted Activities. 1-1-1

Required of all freshmen excused from P. E. 101-2-3.

Special activities for those students who cannot meet the requirements of the regular course because of a physical handicap.

Mr. Miller and Staff.

P. E. 211, 212, 213. Restricted Activities. 1-1-1

Required of all sophomores excused from P. E. 201-2-3.

Special activities for those students who cannot meet the requirements of the regular course because of physical handicap.

Mr. Miller and Staff.

P. E. 401. Social Recreation. 0-0-3

Elective to teachers of agriculture.

Prerequisite: Junior or Senior standing.

This course is especially prepared to meet the demands made of teachers of agriculture to assume leadership in social and recreational activities. The content of the course deals with the organization, supervision and practice work in athletic and social activities for parties, picnics, campus, banquets and similar occasions. Mr. Miller.

PHYSICS

Professors: C. M. HECK, M.A., *Head of the Department*
J. B. DERIEUX, Ph.D.
A. A. DIXON, Ph.D.
Associate Professor: J. S. MEARES, M.S.
Assistant Professor: F. W. LANCASTER, Ch.E.
Instructors: R. F. STAINBACK, S.M.E.
G. W. BARTLETT, M.S.
Teaching Fellows: R. W. STEPHENSON, B.S.
J. E. YATES, B.S.

Facilities.—The Department of Physics occupies the northern half of Daniels Hall—three floors, with six laboratories and five lecture rooms. The basement is devoted to research laboratories, shops, dark rooms, and battery and power center. The two floors above comprise laboratories, lecture rooms, offices, and apparatus rooms.

Equipment.—The Department is equipped with laboratory apparatus in a sufficient number of sets to permit all students in a laboratory to work during the same period on the same experiment. All lectures are demonstrated with a rather full equipment of apparatus collected through many years.

On the roof of the building is located the astronomical observatory and the research radio laboratory. The five-inch telescope is equatorially mounted and driven by clock work.

The Department is equipped for research in certain fields of Physics.

Courses for Undergraduates

Phys. 102. Physics Survey. 0-3-0

An introductory survey of physical phenomena, with the scientific method developed and conclusion drawn therefrom; designed for the enrichment of the student's thinking. Mr. Heck.

Phys. 105, 106, 107. General Physics. 4-4-4

A general survey of the phenomena, laws, and devices of modern physical science. Millikan, Gale, and Edwards, *First Course in Physics for College.*
Mr. Heck, Mr. Bartlett.

Phys. 111, 112, 113. Physics for Textile Students. 4-4-4

Required of freshmen in the Textile School. Prerequisite: Math. 100.
Industrial Physics, with emphasis on practical applications to textile industry. Foley, *College Physics,* 2nd edition.
Messrs. Derieux, Lancaster, Meares.

Phys. 115. Physics for Agricultural Students. 5 or 5 or 5

Required of sophomores in Agriculture.
Elements of machines, physics of heat and weather, and applications of light and electricity on the farm. Henderson, *The New Physics of Everyday Life.* Mr. Heck, Mr. Bartlett.

Phys. 123. Descriptive Astronomy. 0-0-3

Elective.
The sun and planets, the stars and modern research in astronomy; observations with telescope. Baker, *Introduction to Astronomy.* Mr. Heck.

Phys. 201, 202, 203. Physics for Engineers. 4-4-4

Required of sophomores in Engineering. Prerequisite: Math. 102.
General Physics, with emphasis on problems and engineering applications. Hausmann-Slack, *Physics.*
Messrs. Heck, Derieux, Dixon, Meares, Lancaster, Bartlett, Stainback.

Phys. 205, 206, 207. Physics for General Engineering. 5-5-5

Required of sophomores in general engineering. Prerequisite: Math. 102.
Similar to Physics for Engineers but including more of the development and applications of the subject. Mr. Heck, Mr. Bartlett.

Phys. 211, 212, 213. Advanced Physics. 4-4-4

Elective. Required of sophomores specializing in Physics. Prerequisite: Phys. 107, Math. 103.
Designed for teaching Physics in secondary schools or for those desiring specialization in Physics. Duncan and Starling, *Textbook of Physics.*
Mr. Heck.

Phys. 302, 303. Mechanics. 0-3-3 or 0-4-4

Elective. Prerequisite: Phys. 213, Math. 203.
The physics principles of mechanics. Edser, *Physics for Students.*
Mr. Derieux.

Phys. 305, 306. Electricity and Magnetism. 3-3-0 or 4-4-0

Elective. Prerequisite: Phys. 213 or 203.

Fundamental principles of the subject in a more specialized but intermediate manner. Laboratory, if taken, increases the course to 4 credits. Gilbert, *Electricity and Magnetism.* Mr. Dixon.

Phys. 307. Elementary Modern Physics. 3-0-0 or 0-0-3

Required of juniors in Electrical Engineering and of seniors in Ch. E. Prerequisite: Physics 203. Math. 203.

Evolution of the electron theory, constitution of matter, conduction in gases, conduction in non-metallic liquids, conduction in solids, radiation, photoelectric emission, thermionic emission, X-rays, radioactivity, cosmic rays, transmutation. Hull, *Modern Physics.* Mr. Derieux, Mr. Dixon.

Phys. 309. Electron Tubes and Their Application to Industry. 0-0-3

Elective. Prerequisite: Phys. 107 or 203. Math. 203.

Thermionic emission, various thermionic emitters, secondary emission, space charge, discharge in gases, photoelectricity, photoconductivity, and the photovoltaic effect. Laboratory substituted for lectures as needed. Koller, *Physics of Electron Tubes.* Mr. Dixon.

Phys. 311. Light in Industry. 3-0-0 or 0-0-3

Required for Textile students; elective for all other students. Prerequisite: Phys. 107 or equivalent.

Fundamentals of light, illumination and color; psychology of color; standardized color theory with principles applied to selection, mixing, matching, lighting, pigments, contrast, and harmony.

Mr. Lancaster.

Phys. 313. Industrial Optics. 3-0-0

Elective, especially for Engineering and Industrial Management students. Prerequisite: Phys. 203. Math. 203.

Photometric units, photometry and illumination, light sources, radiometry and spectroradiometry, color, light-sensitive cells, optical glass types and manufacture, design, manufacture, and testing of optical parts, lens errors and corrections, design and manufacture of optical instruments. Hardy and Perrin, *Principles of Optics.* Mr. Derieux.

Phys. 314, 315. Light. 0-3-3 or 0-4-4

Elective. Prerequisite: Phys. 203 or 207 and Math. 203.

Introduction to principles of geometrical and physical optics. Edser, *Light for Students.* Mr. Derieux.

Phys. 322. Meteorology. 0-3-0

Required of juniors in Forestry.

Causes of weather change, methods of forecasting, and peculiarities of the weather of North Carolina. Blair, *Weather Elements.* Mr. Heck.

Phys. 332. Photography. 0-3-0

Elective. Prerequisite: Phys. 107 or equivalent.

A general study of cameras and lenses; exposure, development, printing, emulsion, sensitivity, and filters. Mr. Meares.

Phys. 401, 402, 403. Theoretical Mechanics. 3-3-3

Prerequisite: Phys. 203. Math. 203.

Gyroscopic motion, spiral orbits, compound pendulum, bifilar suspensions, coupled systems, damped and forced oscillations, elasticity, surface tension, osmosis, motion of fluids, viscosity, and wave motion. Preston, *Mechanics of Particles and Rigid Bodies.* Mr. Derieux.

Physics 406. Spectroscopy in Industry. 0-3-0 or 0-4-0

Prerequisite: Phys. 203 and Math. 203.

Elementary principles, spectroscopic equipment, spectra, spectrum analysis, quantitative spectroscopy, industrial applications of emission, spectrum analysis, spectrophotometry, absorption spectroscopy, application of absorption spectroscopy, concluding survey. Text: *Spectroscopy in Science and Industry* by Judd Lewis.

Phys. 407. Geometrical Optics. 3-0-0

Prerequisite: Phys. 203, Math. 203.

Photometry, intrinsic energy, luminosity, curved mirrors, refraction through a prism, refraction at curved surface, thin lens, lenses in system of thick lenses, the eye and spectacles, dispersion, aberrations, resolving power, achromatic lenses, and optical instruments. Houston, *A Treatise on Light.* Mr. Derieux.

Phys. 408, 409. Physical Optics. 0-3-3

Prerequisite: Phys. 203, Math. 203.

Velocity of light, composition of wave, velocity of wave transmission, wave theory of light, spectra, Doppler, effect, absorption, anomalous dispersion, interference, interferometers, color photography, diffraction, and gratings, polarization, and saccharimetry. Houston, *A Treatise on Light.* Mr. Derieux.

Phys. 411, 412, 413. Modern Physics. 3-3-3

Elective. Prerequisite: Phys. 203 or 207 and Math. 301.

Alternating currents, electromagnetic radiation, moving charge, the electron, kinetic theory of gases, thermionics, photoelectric effect, X-rays, spectra, atomic structure, ionizing potential, radio and television, radioactivity, isotopes, geophysics, astrophysics, relativity, specific heats, high frequency sound, recent ideas. Ritchmeyer, *Modern Physics.* Mr. Derieux.

Phys. 418, 419. Experimental Optics. 0-2-2

Laboratory work with the photometer, spectrometer, gratings, Fresnel byprism and mirrors, polarimeter, saccharimeter, and interferometer. Mann, *Manual of Optics.* Mr. Derieux.

Phys. 421. Heat. 3-0-0

Elective. Prerequisite: Phys. 203 or 207 and Math. 203.

Methods of temperature measurement, specific heats, thermal expansion in solids, in liquids, and in gases, conduction, radiation, kinetic theory of gases, change of state, continuity of state, thermodynamics, low temperatures, high temperatures. Cork, *Heat.* Mr. Derieux, Mr. Dixon.

Phys. 427. Sound. 0-0-3 or 0-0-4

Elective. Prerequisite: 12 term credits in Physics.

Production, propagation, and reception of sound, with analysis of physical basis of music. Watson, *Sound.* Mr. Heck.

Phys. 435. History of Physics. 0-0-3

Elective. Prerequisite: One course in College Physics.

Development of Physics from its beginnings to the present time. Crew, *Rise of Modern Physics.* Mr. Heck.

Phys. 445, 446, 447. Research. 3-3-3

Elective. Prerequisite: Phys. 203 or 207.

Undergraduate research given according to the student's ability. Mr. Heck.

Phys. 451, 452, 453. Physics Colloquium.

Current research reviewed by department and advanced students; meets weekly at night throughout the year. Mr. Heck.

Phys. 511. Kinetic Theory of Gases. 3-0-0

Prerequisite: Phys. 203, Math. 203.

Laws of Maxwell, Dalton, Avogadro, first and second laws of thermodynamics, mean free path, viscosity, diffusion, Van de Waals' equation, critical point, triple point, solution, vapor and osmotic pressure, boiling point, freezing point, heat of solution, dissociation. Kleeman, *Kinetic Theory of Liquid and Gases.* Mr. Derieux.

Phys. 514, 515, 517. Advanced Theory of Electricity and Magnetism. 3-3-3

Prerequisite: Phys. 203, Math. 301.

Theorem of Gauss, energy in media, boundary conditions, condensers, electrometers, dielectric constants, migration of ions, thermodynamics of reversible cells, thermo-electricity, galvanometers, magnetic circuits, growth and decay of currents, oscillatory discharge, and alternating currents. Starling, *Advanced Theory of Electricity and Magnetism.* Mr. Dixon.

Phys. 522. Discharge of Electricity in Gases. 0-3-0

Prerequisite: Phys. 213, Math. 203.

Production of ions in gases, motion of ions, velocity in an electric field, diffusion, recombination, determination of atomic charge, ionization by collision, discharge tubes, cathode rays, positive rays, and X-rays. Crowther, *Ions, Electrons, and Ionizing Radiations.* Mr. Dixon.

Phys. 525. Atomic Theory. 3-0-0

Elective. Prerequisite: Phys. 312.

Bohr's model, spectral formula, elliptical orbits, fine structure of spectral lines, Stark effect, Zeeman effect, Roentgen rays, Moseley's law, periodic system, isotopes, radioactivity, atomic nuclei, ionization, spectra and atomic structure, fluoroscence, atomic magnetism. White, *Atomic Spectra.*

Mr. Dixon.

Phys. 531, 532, 533. Research. 3-3-3

Open to all graduates. Every graduate student sufficiently prepared is expected to undertake research in some particular field of Physics. At least six hours a week must be devoted to such research.

Messrs. Heck, Derieux, and Dixon.

POULTRY SCIENCE

Professor: R. S. DEARSTYNE, *Head of the Department*
Assistant Professor: N. W. WILLIAMS
Instructors: H. C. GAUGER
R. E. GREAVES
F. W. COOK

Laboratories.—The Poultry Department is housed on the second and third floors of Ricks Hall. It embraces the Disease-Diagnostic, the Anatomy, and the Disease-Research Laboratories, the Incubator Room, and two Live-Bird Laboratories.

The Seminar Room, affording access to technical and to popular poultry publications, is open to the students at all times. The Disease and Anatomy Laboratories are well equipped for teaching.

* Only two of the following alternate gamuts may be given each year: either 501, 502, 503 or 505 and 506, 507, or 511; and either 514, 515, 517 or 522.

The Poultry Plant consists of forty buildings located on seventeen acres of land. An 18,000-capacity Smith incubator is used for teaching commercial incubation.

Research.—A substantial research program is in operation at this plant. Three breeds of birds are kept and approximately 2000 layers are maintained. All birds are pedigreed and trapnested. About 4000 chicks are produced each year, all of these being pedigreed.

Courses for Undergraduates

Poul. 201. General Poultry. 3-0-0

Required of sophomores in Agriculture.

Fundamental principles of poultry production.

Mr. Williams, Mr. Dearstyne.

Poul. 301. Poultry Judging. 3-0-0

Required of juniors in Poultry Production, elective for others. Prerequisite: Poul. 201.

Poul. 303. Incubation and Brooding. 0-0-3

Required of juniors in Poultry Production, elective for others.

Prerequisite: Phys. 115, Poul. 201.

Principles of incubator and brooding operation, feeding, housing, and rearing baby chicks. Mr. Williams.

Poul. 311, 312. Poultry Anatomy and Physiology. 3-3-6

Required of juniors in Poultry Science; elective for others. Prerequisite: Poul. 201, Zool. 202.

A foundation for courses in poultry diseases and nutrition. Mr. Cook.

Poul. 322. Poultry Production. 0-3-0

Elective. Prerequisite: Poul. 201.

Developed for vocational teachers of agriculture. Poultry disease problems; nutritional problems; judging methods.

Mr. Dearstyne, Mr. Williams.

Poul. 332. Preparation and Grading of Poultry Products. 0-3-0

Required of juniors in Poultry; elective for others. Prerequisite: Poul. 201.

Commercial fattening, grading and marketing eggs. Refrigerating and storage, markets. Mr. Williams.

Poul. 333. Poultry Nutrition. 0-0-4

Required of juniors in Poultry Production; elective for juniors in Agriculture. Prerequisite: Chem. 101, Zool. 101 and 102, Poul. 201.

Feeds and feeding: physiology of digestion, absorption, and elimination; mineral and vitamin requirements. Mr. Dearstyne, Mr. Cook.

Courses for Advanced Undergraduates

Poul. 401, 402. Poultry Diseases. 4-4-0

Required of seniors in Poultry Science, elective for others. Prerequisite: Poul. 201, Zool. 102.

Sanitation, parasite infestations and control, contagious and non-contagious diseases of the fowl. Mr. Gauger.

Poul. 403. Sero-Diagnosis in Poultry Diseases. 0-0-3

Required of seniors in Poultry Science. Prerequisite: Poul. 201, 401.

Antigen and vaccine preparation. Application of the agglutination test for pullorum disease carriers. Mr. Greaves.

Poul. 412. Commercial Poultry Plant Management. 0-3-0

Required of seniors in Poultry Science, elective for others. Prerequisite: Poul. 201.

Development and maintenance of a commercial poultry plant, custom hatching, and commercial incubation; cost of production. Mr. Williams.

Poul. 413. Selection and Mating of Poultry. 0-0-3

Required of seniors in Poultry Production; elective for juniors in Agriculture. Prerequisite: Poul. 201, Genetics, Zool. 411.

Methods of recognition and selection for mating from both standard and utility standpoints. Study of progeny performance. Mr. Dearstyne.

Poul. 423. Senior Seminar. 0-0-3

Required of seniors in Poultry. Mr. Dearstyne.

Courses for Graduates Only

Poul. 501, 502, 503. Poultry Histology. 3-3-3

Prerequisite: 311, 312, 401, 402, Zool. 461.

General histology of the tissues and special histology of the various systems of the body. Mr. Cook.

Poul. 511, 512, 513. Poultry Pathology. 3-3-3

Prerequisite: 311, 312, 401, 501, 502, 503.

Various disease processes which may take place within the bird's body. Mr. Cook.

Poul. 521. Poultry Physiology. 3-0-0

Prerequisite: 311, 312, 401, 402, 501, 502.

This course accompanies histology and pathology to emphasize the effects of diseases on normal physiology. Mr. Cook.

Poul. 531, 532, 533. Poultry Research. 3-3-3

Prerequisite: Eighteen term credits in Poultry.

Problems in poultry nutrition, diseases, marketing, and breeding may be undertaken. Such problems shall be conducted on a definitely outlined basis acceptable to the department. Poultry Staff.

Poul. 541, 542, 543. Seminar. 3-3-3

Prerequisite: Eighteen credit hours in Poultry. Mr. Dearstyne.

Poul. 551, 552, 553. Production Studies and Experiments. 3-3-3

Prerequisite: Poul. 201, 333, 401, 402.

Problems in Poultry nutrition, breeding, and commercial poultry production and marketing. Mr. Dearstyne.

PSYCHOLOGY

Psychol. 200. Introduction to Psychology. 3 or 3 or 3

A study of the general characteristics and development of human behavior, emphasizing the problems of motivation, emotion, learning, and thinking. Staff.

Psychol. 200-A. Introduction to Psychology Laboratory. 1 or 1 or 1
Mr. McGehee.

Psychol. 291. Psychology of Personality. 0-0-3

Prerequisite: Psychology 200.

A study of the factors involved in the development of the normal personality. Mr. McGehee.

Psychology 302. Applied Psychology. 0-3-0 or 0-0-3

Prerequisite: Psychology 200.

The practical application of psychological principles in special fields. Attention will be given to the analysis of problems arising in business, professional, and everyday life. Special reference to the psychological aspects of advertising, salesmanship and personnel selection. Mr. McGehee.

Psychol. 303. Educational Psychology. 3-3-0

(For description of the course see Ed. 203.) Mr. Garrison.

Psychol. 338. Industrial Psychology. 0-0-3

Prerequisite: Psychology 200.

The application of psychological principles to the problems of modern industry. The factors involved in the employment of men, as well as specific matters such as industrial learning, methods of work, monotony, fatigue, illumination, accidents, and the morale of workers will be considered.

Mr. Garrison.

Psychol. 290. Social Psychology. 0-3-0

Prerequisite: Psychol. 200 and 3 additional term credits in Sociology or Psychology.

Social applications of Psychology; social stimulation, response, and attitudes. Mr. Garrison.

Psychol. 468. Measurements in Educational Psychology. 0-3-0

(For description of the course see Ed. 468.) Mr. McGehee.

Psychol. 471. Psychology of Exceptional Children. 3 credits

Psychol. 476. Psychology of Adolescence. 3-0-0

(For description of course see Ed. 376.)

Psychol. Ex. 477. Psychology of Secondary Education. 3 credits

Psychol. 400. Problems in Social and Industrial Psychology. 3-3-0 or 0-3-3

Prerequisite: Psychol. 305 or 9 credits in Psychology.

Designed for students interested in a study of psychological aspects of social or industrial situations. Collateral reading and individual reports will characterize the course. Staff.

Psychol. 503. Problems in Educational Psychology. 3-3-0

(For description of the course see Ed. 403.) Mr. Garrison.

SOCIOLOGY

Professor: SANFORD R. WINSTON
Instructor: WILLIAM MCGEHEE

Purpose.—The Department of Sociology has a threefold function. Its work is designed, first, to provide basic courses for students interested in obtaining a general knowledge in the social science field. It has, secondly, the function of providing general and specific courses for students interested in a further study of social life to correlate with their own future life work. A third function lies in the preparation, in conjunction with other Departments, of students for positions in specific fields, such as social work, rural sociology, vocational education, and social research in governmental agencies.

Courses for Undergraduates

Soc. 101, 102, 103. Human Relations. 2-2-2

Required of students in the Schools of Agriculture and Textiles who do not take Military Science. Elective for others. Not open to upperclassmen.

An orientation course, designed to introduce the student to the social problems of our time. Staff.

Soc. 202. Introductory Sociology. 3-0-0 or 0-3-0 or 0-0-3

Required of students in Forestry; elective for others.

An introduction to the basic principles underlying social life and the factors connected with it. Identical with the first term of General Sociology. Messrs. Winston and McGeehee.

Soc. 202, 203. General Sociology. 3-3-0

An analysis of the fundamental factors affecting life in modern society. The second term of the course deals with practical social problems, using the tools developed in the first term. Mr. Winston.

Soc. Ex. 210. General Anthropology. 3 credits

An introduction to the study of man; a consideration of his development from earliest forms to the present. Mr. Winston.

Courses for Graduates and Advanced Undergraduates

Soc. Ex. 400. Criminology. 3 credits

Prerequisite: Soc. 202, supplemented by credits in related fields.

Causes and conditions leading to crime, methods of handling criminals, and various factors producing criminal behavior. Mr. Winston.

Soc. 401. Social Pathology. 0-0-3

Prerequisite: Soc. 202, supplemented by credits in related fields.

Outstanding pathological problems reacting from social life; social and individual adjustments. Mr. Winston.

Soc. Ex. 402. Sociology of City Life. 3 credits

Elective. Prerequisite: Soc. 202, supplemented by credits in related fields.

Problems arising from growth of modern town and city life; city planning in regard to social and industrial progress. Mr. Winston.

Soc. Ex. 403. Leadership. 3 credits

Prerequisite: Nine term credits in the Social Sciences, including Sociology 202.

A study of leadership in various fields of American life, together with the analysis of the various factors, inherent or acquired, that are associated with leadership, past and present. Mr. Winston.

Soc. Ex. 404. Educational Sociology. 3 credits

Prerequisite: Nine term credits in the Social Sciences, including Sociology 202.

Application of the principles of Sociology to the practical problems of education with emphasis placed on the relationship between adjustment processes in the school and in the larger social world. Mr. Winston.

Soc. 406. The Family Organization. 3-0-0

Prerequisite: Soc. 202, supplemented by credits in related fields.

Premarital, marital, and family relationships; effects of present-day social changes; various efforts to stabilize the family. Mr. Winston.

Soc. 407. Race Relations. 3-0-0

Elective. Prerequisite: Soc. 202, supplemented by credits in related fields.

Race problems in America and in other countries; social, economic, and educational status of racial groups; international relationships.
Mr. Winston.

Soc. Ex. 408. Social Anthropology. 3 credits

Analysis of present-day culture, with particular reference to the United States and its regional variations. Mr. Winston.

Soc. 410. Industrial Sociology. 0-0-3

Prerequisite: Soc. 202, supplemented by credits in related fields.

Influence of industrial life; occupations as social and industrial factors; problems arising from our industrial era. Mr. Winston.

Soc. 411. Population Problems. 0-3-0

Prerequisite: Soc. 202, supplemented by credits in related fields.

Analyses of outstanding problems connected with the growth and decline of populations in the United States; factors connected with birth and death rates; marriage rates; discussion of the changing quality of population groups. Mr. Winston.

Soc. 415. Research in Applied Sociology. 2-2-2

Prerequisite: Nine hours of Sociology, and permission of the instructor.

Individual research problems in applied fields of sociology, such as problems of the family, of population of social work; rural-urban relationships; student success; American leadership. Mr. Winston.

SOILS DIVISION

See Agronomy

TEXTILES

Courses for Undergraduates

Tex. 101, 102, 103. Textile Principles Laboratory. 1-1-1

Required of freshmen in all Textile curricula.

Operation of plain and automatic looms and carding and spinning machines. Mr. Peeler, Mr. Culberson.

Tex. 105. Textile Principles. 3-0-0 or 0-0-3

Required of freshmen in all Textile curricula.

Principles of manufacture involved in the textile industry. Elementary calculations for yarns and fabrics; harness and reed calculations; loom production calculations. Textile Staff.

Tex. 205. Yarn Manufacture I. 3-0-0 or 0-0-3

Tex. 201, 203. Yarn Manufacture Laboratory I. 1-0-1 or 0-1-1

Required of sophomores in all Textile curricula.

Mixing of cotton, description and setting of openers, pickers, and cards. Production, speed and draft calculations. Operation and fixing of machines. Grinding and setting cards. Mr. Hilton, Mr. Culberson.

Tex. 211. Knitting I. 2-0-0 or 0-0-2

Tex. 207, 208, 209. Knitting Laboratory I. 1-1-1

Required of sophomores in all Textile curricula.

Selection and preparation of knitting yarns, knitting mechanisms, plain and rib knitting machines, circular ribbers, and circular automatic machines. Operation of machines, practical experiments, hosiery analysis, topping, transferring, and looping. Mr. Lewis.

Tex. 234. Power Weaving. 0-2-0

Tex. 231, 232. Power Weaving Laboratory. 1-1-0 or 0-1-1

Required of sophomores in all Textile curricula.

Construction of auxiliary motions on plain looms. Cams and their construction. Drop-box loom construction. Methods of pattern chain building. Construction and value of pattern multipliers. Timing of drop-box motion, and other motions.

Operation and fixing of plain, automatic and drop-box looms. Pattern chain building for drop-box looms. Mr. Nelson, Mr. Peeler.

Tex. 236, 237. Fabric Structure and Analysis. 0-2-2 or 4-0-0

Required of sophomores in all Textile curricula.

Systems of numbering woolen, worsted, silk, linen, rayon, and cotton yarn. Plain, twill, and sateen weaves. Ornamentation of plain weaves; wave designs; pointed twills; diamond effects; plain and fancy basket weaves; warp and filling rib weaves.

Analyzing plain, twill, sateen, and other fabrics made from simple weaves, ascertaining the number of ends and picks per inch in sample. Fabric analysis calculations. Mr. Lewis, Mr. Peeler.

Tex. 239. Principles of Textile Manufacturing I. 3-0-0

A study of the processes and machines used in textile manufacture, planned as an overview course for those preparing to be teachers of industrial arts in junior and senior high schools or in vocational schools.

Mr. Nelson, Mr. Hilton.

Courses for Advanced Undergraduates

Tex. 304. Yarn Manufacture II. 0-3-0

Tex. 301, 302, 303. Yarn Manufacture Laboratory II. 1-1-1

Required of juniors in Textile Manufacturing. Elective for others. Prerequisite: Yarn Manufacture I, Tex. 201, 3, 5.

Tex. 310, 311. Yarn Manufacture III. 0-3-3

Tex. 307, 308, 309. Yarn Manufacture Laboratory III. 2-2-2

Required of juniors in Yarn Manufacturing. Prerequisite: Yarn Manufacture I, Tex. 201, 3, 5.

Construction of draw frames; sliver lappers; ribbon lappers; comber; mechanical and electrical stop motions; description and setting of the different parts; weighting of rolls; types of roll covering; care of machines; fly-frame builder and differential motions.

Operation and fixing of draw frames; sliver lappers; ribbon lappers; comber and fly-frames. Changing of hank roving and the setting of rolls and speeder motions. Mr. Hilton, Mr. Culberson.

Tex. 316. Knitting II. 0-3-0

Tex. 313, 314, 315. Knitting Laboratory II. 1-1-1

Elective for Textile students. Prerequisite: Knitting I, Tex. 307, 8, 9, 11.

Advanced circular mechanisms. Hosiery design. Auxiliary knitting machinery. Warp and spring needle knitting. Knitting machinery lay-out and organization. Production control and costs. Laboratory experiments. Mr. Lewis.

Tex. 335. Dobby Weaving. 3-0-0 or 0-0-3

Tex. 331, 332, 333. Dobby Weaving Laboratory I. 1-1-1

Required of juniors in Textile Manufacturing and Yarn Manufacturing. Elective for others.

Tex. 337, 338, 339. Dobby Weaving Laboratory II. 2-2-2

Required of juniors in Weaving and Designing. Prerequisite: Power Weaving, Tex. 231, 2, 4.

Methods of drawing in and starting up cotton and rayon warps. Setting of harness shafts. Selection of springs or spring jacks. Construction and methods of fixing single and double index dobbies. Methods of pattern-chain building.

Preparation of warps for weaving cotton and rayon fabrics on dobby looms; starting up warps in looms; fixing single and double index dobbies; pattern-chain building; operation of dobby looms. Mr. Nelson, Mr. Hart.

Tex. 341, 342. Fabric Design and Analysis I. 3-3-0 or 0-3-3

Required of juniors in Textile Manufacturing and Weaving and Designing. Elective for others.

Prerequisite: Fabric Structure and Analysis, Tex. 236, 7.

Construction of fancy weaves, such as broken twills, curved twills, entwining twills; granite weaves. Imitation leno; honeycomb weaves; fabrics backed with warp or filling; fabrics ornamented with extra warp or filling; combining weaves together to produce new patterns.

Analyzing samples of fancy fabrics for design, drawing in draft, reed, and chain plan. Calculating particulars to reproduce fabrics from data obtained from sample. Mr. Shinn.

Tex. 343. Fabric Testing. 0-0-1

Required of juniors in Textile Manufacturing, Textile Chemistry and Dyeing, and Weaving and Designing. Prerequisite: Fabric Structure and Analysis, Tex. 236, 7.

Testing fabrics for strength. Effect of heat upon fabrics. Effect of regain upon tensile strength. Elasticity of fabrics. Micrometer and calculated tests for fabric thickness. Mr. Shinn.

Tex. 344. Calculating Fabric Costs. 0-3-0

Elective for Textile students. Prerequisite: Fabric Structure and Analysis, Tex. 236, 7.

Special attention is given to distribution of costs to various productive processes, summarizing costs, the determination and use of unit costs, and the making of cost reports. Mr. Shinn.

Tex. 345. Textile Calculations I. 0-0-3

Required of juniors in Textile Manufacturing and Weaving and Designing. Elective for others. Prerequisite: Fabric Structure and Analysis. Tex. 236, 7.

An intensive course in calculations for designing, weaving, and analyzing cotton, rayon, silk, wool, worsted and linen yarns and fabrics. Weight of fabrics, ends and picks per inch. Costing of fabrics. Reed and harness calculations. Loom speed and production. Mr. Hart.

Tex. 347. Principles of Textile Manufacturing II. 0-0-3

Prerequisite: Principles of Textile Manufacturing I, Tex. 239.

A study of the operation and care of textile machines, planned for those who are preparing to be teachers in vocational schools.

Mr. Nelson, Mr. Hilton.

Tex. 375. Dyeing I. 3-0-0 or 0-0-3
and
Tex. 371, 372, 373. Dyeing Laboratory I. 1-1-1

Required of juniors in Textile Manufacturing. Elective for others. Prerequisite: Chemistry 101, 3, 5.

Physical and chemical properties of textile fibres. Chemicals used in preparing fibres for dyeing. Methods of applying substantive, sulphur, basic, developed, acid, acid chrome, mordant and vat dyes. Effect of changes in temperature and volume of the dye bath. Theory of dyeing mixed fabrics. Theory of mercerizing. Tests for the chemical constituents of the fibres. Dyeing experiments using all the different classes of dyes on the various fibres. Tests showing effect of varying such factors as bath, temperature and time. Test for fastness to light, washing, cross-dyeing, and so forth. Mercerizing experiment.

Mr. Grimshaw, Mr. Hayes.

Tex. 381, 382. Dyeing II. 3-3-0
and
Tex. 377, 378, 379. Dyeing Laboratory II. 2-2-2

Required of juniors in Textile Chemistry and Dyeing. Prerequisite: Chemistry 101, 3, 5.

Physical and chemical properties of textile fibres. Lectures on wool, silk, rayon, and cotton; hydrometers and chemicals used in dyeing and finishing. Application of dyestuffs to different fibres. Effect of changing bath, temperature, or time factor. Money value and strength test of dyes. Theory of dyeing mixed fabrics. Mercerizing.

Microscopic examination of textile fibres. Dyeing experiments using different classes of dyes on textile fibres. Tests showing the effects of varying such factors as bath, temperature, and time. Fastness to light, washing, and cross dyeing. Money value and strength of various dyes. Mercerizing. Mr. Grimshaw, Mr. Hayes.

Courses for Graduates and Advanced Undergraduates

Tex. 405. Yarn Manufacture IV. 3-0-0 or 0-0-3

Tex. 401, 402, 403. Yarn Manufacture Laboratory IV. 1-1-1

Required of seniors in Textile Manufacturing. Elective for others. Prerequisite: Yarn Manufacture, Tex. 301, 2, 3, 4.

Tex. 411, 412. Yarn Manufacture V. 3-3-0

Tex. 407, 408, 409. Yarn Manufacture Laboratory V. 2-2-2

Required of seniors in Yarn Manufacturing. Prerequisite: Yarn Manufacture, Tex. 307, 8, 9, 10, 11.

Spinning; spooling; warping; twisting. Description and setting of different parts. Builder motions for warp and filling. Bobbin holders, thread guides, traverse motions. Ply yarns. Calculations for twist, speed, and production.

Practical methods of spinning, warping, spooling, winding and twisting. Setting of spinning rolls, spinning frame builder motions for warp, filling, and combination build. The practical application of all machines in Yarn Manufacture. Mr. Hilton, Mr. Culberson.

Tex. 413. Textile Calculations II. 3-0-0

Required of seniors in Yarn Manufacturing. Elective for others. Prerequisite: Yarn Manufacture II or III, Tex. 304 or 310, 11.

Principles underlying the calculation of draft, twist, speed, and production. Systems of numbering yarns. Doubling and twisting yarns. Lay, tension, differential, and cone drum calculations. Practice in solving practical mill problems. Mr. Hilton.

Tex. 415. Manufacturing Problems. 0-0-3

Required of seniors in Yarn Manufacturing. Elective for others. Prerequisite: Yarn Manufacture II or III, Tex. 304 or 310, 11.

Mill organization and administration. Machine layout for long and regular draft spinning; production control and costs; making of novelty yarns; making of daily and weekly reports; breaking of single and ply yarns. Regular and reverse twisted yarns. Mr. Hilton.

Tex. 435. Cotton and Rayon Weaving. 0-0-3

Tex. 431, 432, 433. Cotton and Rayon Weaving Laboratory I. 1-1-1

Required of seniors in Textile Manufacturing. Elective for others. Prerequisite: Dobby Weaving, Tex. 331, 2, 3, 5.

Tex. 437, 438, 439. Cotton and Rayon Weaving Laboratory II. 2-2-2

Required of seniors in Weaving and Designing. Prerequisite: Dobby Weaving, Tex. 335, 7, 8, 9.

Principles of loom construction to weave rayon and fine cotton fabrics. Pick and pick looms. Box and multiplier chain-building. Arrangement of colors in boxes to give easy running loom. Extra appliances for weaving leno, towel, and other pile fabrics. Construction and operation of single, double lift, and rise and fall jacquards. Tie-up of harness for dress goods, table napkins, damask, and other jacquard fabrics, such as leno. Relative speed of looms. Production calculations and fabric costs.

Operation and fixing of dobby, pick and pick, and jacquard looms. Preparation of warps to weave rayon and fine cotton fabrics. Building of box, dobby, and multiplier chains. Mr. Nelson, Mr. Hart.

Tex. 441. Leno Design. 3-0-0 or 0-3-0

Required of seniors in Textile Manufacturing and in Weaving and Designing. Elective for others. Prerequisite: Fabric Design and Analysis I, Tex. 341, 2.

Leno weaves with one, two, or more sets of doups. Combinations of plain and fancy weaves with leno. Methods of obtaining leno patterns. Methods of making original designs for dress goods, draperies.

Mr. Nelson, Mr. Shinn.

Tex. 443. Dobby Design. 3-0-0 or 0-3-0

Required of seniors in Textile Manufacturing and in Weaving and Designing. Elective for others. Prerequisite: Fabric Design and Analysis I, Tex. 341, 2.

Designing fabrics, such as fancy crepes, figured double plain, matelasse, velvets, corduroys, pique, lines of samples. Mr. Nelson.

Tex. 445. Jacquard Design. 0-0-3

Required of seniors in Textile Manufacturing and juniors in Weaving and Designing. Elective for others. Prerequisite: Fabric Design and Analysis I, Tex. 341, 2.

Designing fancy and jacquard fabrics. Methods of making original designs for table napkins, table covers, dress goods, draperies.

Mr. Nelson, Mr. Shinn.

Tex. 447, 448, 449. Jacquard Design Laboratory. 1-1-1

Required of seniors in Weaving and Designing. Prerequisite: Jacquard Design, Tex. 445.

Designing fancy and jacquard fabrics. Methods of making original designs by combinations of color, weave, and sketches. Designs for table napkins, table covers, dress goods, draperies. Mr. Nelson, Mr. Shinn.

Tex. 451, 452. Fabric Analysis. 2-2-0

Required of seniors in Textile Manufacturing and Weaving and Designing. Elective for others. Prerequisite: Fabric Design and Analysis, Tex. 341, 2.

Analyzing samples of cotton, wool, worsted, linen, rayon, and silk fabrics for size of yarns, ends and picks per inch, weight of warp and filling, so as to accurately reproduce samples analyzed. Obtaining design, drawing in draft, chain, and reed plan for fancy fabrics, such as stripes, checks, extra warp and extra filling figures, leno fabrics, jacquard fabrics, draperies.

Mr. Nelson, Mr. Shinn.

Tex. 453. Fabric Design and Analysis II. 0-0-3

Required of seniors in Weaving and Designing. Prerequisite: Fabric Design and Analysis I, Tex. 341, 2.

Design and analysis of fancy fabrics. Making fabrics from sketches and specifications. Mr. Shinn.

Tex. 455, 456. Color in Woven Design. 3-3-0

Required of seniors in Weaving and Designing. Elective for others. Prerequisite: Fabric Structure and Analysis, Tex. 236, 7.

Pigment and light theories of color. Contrast and harmony of color. Factors which influence quality, style, and color. Methods of applying weaves and color to fabrics for wearing apparel and home decorations.

Mr. Hart.

Tex. 457, 458, 459. Textile Testing. 1-1-1

Elective for Textile students. Prerequisite: Fabric Testing, Tex. 343 or equivalent.

Tests for moisture content, regain, twist, and tensile strength. Description and operation of testing equipment. Solution and written reports of assigned textile problems. Mr. Hart, Mr. Hilton, Mr. Shinn.

Tex. 474. Cotton and Rayon Dyeing I. 0-3-0

Tex. 471, 472, 473. Cotton and Rayon Dyeing Laboratory I. 1-1-1

Required of seniors in Textile Manufacturing. Elective for others. Prerequisite: Dyeing I, Tex. 371, 2, 3, 5.

Lectures on color mixing, money value of dyes. Testing of dyes, water starch, and materials used in sizing. Lubricating oils and oil compounds. Processes and machinery used in dyeing and finishing. Textile printing. Apparatus used in research laboratory.

Color matching. Testing dyes for strength and money value. Physical and chemical examination and application of starches, sizing materials and finishing compounds. Examination of textile oils, soap, and all the different rayons. Analysis of mixed fabrics.

Mr. Grimshaw, Mr. Hayes.

Tex. 480, 481. Cotton and Rayon Dyeing II. 0-3-3

Tex. 477, 478, 479. Cotton and Rayon Dyeing Laboratory II. 2-2-2

Required of seniors in Textile Chemistry and Dyeing. Prerequisite: Dyeing II, Tex. 377, 8, 9, 381, 2.

Theories of color matching. Lectures on color mixing, water and mold, starch, materials used in sizing. Lubricating oils, textile oils and oil compounds. Processes and machinery used in dyeing and finishing. Method of analyzing textile fabrics. Laboratory equipment used in textile research and testing laboratories.

Color matching. Physical and chemical examination and application of textile oils, soaps, and finishing compounds. Microscopical and chemical tests on rayons. Dyeing various types of rayon. Operation of dyeing and finishing equipment in the dye house and research laboratories.

Mr. Grimshaw.

Tex. 487. Textile Printing. 3-0-0

Tex. 483, 484, 485. Textile Printing Laboratory. 1-1-1

Prerequisite: Dyeing II, Tex. 381, 2.

The history of printing and the development of machinery used. Calico printing with the mordant, basic, and vat colors, analine black, indigo, and insoluble azo colors. Resist and discharge styles.

Paste mixing. Practical experiments. Mr. Grimshaw, Mr. Hayes.

Tex. 489, 490. Textile Microscopy. 1-1-0

Required of seniors in Textile Chemistry and Dyeing. Elective for others. Prerequisite: Dyeing I or II, Tex. 375 or 381, 2.

Instruction in the use of the microscope. Examination of fibres. Preparation of permanent slides. Mr. Grimshaw, Mr. Hayes.

Tex. 495. Principles of Fabric Finishing. 0-0-3

Tex. 491, 492, 493. Principles of Fabric Finishing Laboratory. 1-1-1

Elective for Textile students. Prerequisite: Dyeing II, Tex. 371, 2.

A study of machinery used in finishing of textile fabrics and in textile printing, with lectures and pictures. Lectures on materials used in the textile finishing and printing industry and experiments. Mr. Grimshaw.

Courses for Graduates Only

Tex. 501, 502, 503. Yarn Manufacture. 3-3-3

Prerequisite: Yarn Manufacture IV, Tex. 405 or equivalent.

A study of breaking strength and related properties of cotton yarns made under various atmospheric conditions; comparison of yarns produced from long and short-staple cotton with regular and special carding processes; efficiency of various roller covering materials at the drawing processes; elimination of roving processes by special methods of preparation; comparison of regular and long-draft spinning. Mr. Hilton.

Tex. 505, 506, 507. Textile Research. 3-3-3

Prerequisite: Graduate standing.

A study of the moisture content of cotton yarns and fabrics. The convolutions in cotton fibres and their relation to spinning, weaving, and dyeing. The effect of mercerization on cotton yarns and fabrics. Testing yarns and fabrics under variable conditions for breaking strength and elasticity. Textile Staff.

Tex. 531, 532, 533. Textile Design and Weaving. 3-3-3

Prerequisite: Leno, Dobby and Jacquard Design, Tex. 441, 3, 5 or equivalent.

Study and practice in more advanced designing and analyses of fabrics, such as lenos made with twine and wire doups, lappits, and other fancy fabrics. Designing for jacquard dress goods, table covers, reversibles, and other fabrics. Making original designs for dobby and jacquard fabrics. Fabric costs. Weaving fancy and jacquard fabrics.

Messrs. Nelson, Hart, and Shinn.

Tex. 535, 536, 537. Seminar. 1-1-1

Discussion of scientific articles of interest to textile industry. Review and discussion of student papers and research problems. Textile Staff.

Tex. 571, 572, 573. Textile Dyeing. 3-3-3

Prerequisite: C. & R. Dyeing I, Tex. 474 or equivalent.

The course consists of matching shades from standard and season color cards upon classes of materials which require skill in their dyeing, such as three-fibre, cotton-wool, and half-silk hosiery, woolens and worsteds with effect stripes, and cotton fabrics with woven figures or stripes of the different varieties of artificial silk. Advanced work on chemical and microscopical examination of materials used in dyeing and finishing.

Mr. Grimshaw.

Tex. 575. Advanced Textile Microscopy. 0-0-3

Prerequisite: Textile Microscopy, Tex. 489, 490.

Microscopic study of textile starches, fibres, fabrics, oils, etc.

Study of mounting media for above. Methods of mounting textile materials. Methods of cross-sectioning textile materials. Photomicrography.

Mr. Grimshaw.

ZOOLOGY

Professors: Z. P. METCALF, *Head of the Department*
T. B. MITCHELL
Associate Professors: C. H. BOSTIAN
R. O. STEVENS
Assistant Professors: F. B. MEACHAM
F. H. MCCUTCHEON
Instructor: R. HARKEMA

Teaching and Research.—The space devoted to Zoölogy is equipped to present the various subjects and to carry on research in its own and related fields. The Entomology Laboratory has a large Insectary with necessary equipment. The Genetics Laboratory is provided with the usual equipment, and has an especially large collection of breeding animals for research and instruction in their field.

Beekeeping.—The Beekeeping Laboratory is well provided with apparatus to illustrate all phases of beekeeping. A small Apiary is maintained on the College grounds.

Graduate Work.—The Technique and Graduate Laboratories are especially well equipped for the teaching of graduate work. The Museum contains a synoptic collection illustrating most groups of animals.

Courses for Undergraduates

Zool. 101. General Zoölogy. 4-0-0

Required of freshmen in General Agriculture, Teachers of Agriculture, Forestry, Wildlife Conservation, and of juniors in Agricultural Engineering.

An elementary study of animals, with special reference in the morphology and physiology of the vertebrates.

Messrs. Metcalf, Mitchell, Meacham, Bostian, McCutcheon, Harkema.

Zool. 102. Economic Zoölogy. 0-4-0

Required of freshmen in Forestry and Wildlife Conservation; of sophomores in General Agriculture, of Teachers of Agriculture, and in Agricultural Chemistry; of juniors in Landscape Architecture.

An elementary study of animals with special reference to the more important economic groups; designed to give the student a general knowledge of the animal kingdom.

Messrs. Metcalf, Mitchell, Meacham, Bostian, McCutcheon, Harkema.

Zool. 113. Elementary Wildlife Management. 0-0-1

Required of freshmen in Wildlife Conservation.

An introductory survey of the various branches in the field of wildlife management. Mr. Stevens.

Courses for Advanced Undergraduates

Zool. 202. Animal Physiology. 0-5-0 or 0-0-5

Prerequisite: Zool. 101, Phys. 115, Chem. 221. Alternate for sophomores in General Agriculture, Teachers of Agriculture and Agricultural Chemistry; required of juniors in Wildlife Conservation.

Comparative physiology of vertebrates, with particular reference to mammals and man. Detailed studies of various functions, with metabolism emphasized. Mr. McCutcheon.

Zool. 213. Economic Entomology. 0-0-4

Prerequisite: Zool. 102. Required of freshmen in Forestry; juniors in Wildlife Conservation, Landscape Architecture, Teachers of Agriculture, Vegetable Gardening, Pomology, Plant Pathology and Floriculture.

A general study of the insects, including their economic importance and the principles of control. Messrs. Mitchell, Meacham, Bostian.

Zool. 222-223. Comparative Anatomy. 0-4-4

Prerequisite: Zool. 101, 102. Required of sophomores in Wildlife Conservation; of juniors in Entomology.

Comparative morphology of vertebrates. Interrelations of organ systems studied for the various groups. Mr. Harkema.

Zool. 241, 243. Beekeeping. 3-0-3

Prerequisite: Zool. 102. Required of seniors in Entomology.

Designed to give the principles of scientific beekeeping and honey marketing. Mr. Meacham.

Zool. 251, 252, 253. Ornithology. 2-2-2

Prerequisite: Zool. 101, 102. Required of sophomores in Wildlife Conservation.

A course dealing with the biology and morphology of North American birds. Mr. Metcalf.

Zool. 302. Forest Entomology. 0-3-0

Prerequisite: Zool. 213. Required of juniors in Forestry.

A special study of forest insects, including the factors governing abundance, and the application of this knowledge in control. Mr. Mitchell.

Zool. 312. Principles of Game Management. 0-3-0

Elective for juniors and seniors not in Game Management.

Brief survey of the field, study of the major principles involved, and the correlation of wildlife management with other land uses. Mr. Stevens.

Zool. 321, 322, 323. Wildlife Conservation. 3-3-3

Required of juniors in Wildlife Conservation and Management. Prerequisite: Zool. 251, 252, 253, F. C. 202, Bot. 101, 102, 203.

History of game and wildlife management. Relation of wildlife conservation to soil and forest conservation. National and State park, and general farming operations. Mr. Stevens.

Zool. 332. Fur Resources. 0-3-0

Prerequisite: Zool. 321, 322, 323. Elective for juniors and seniors in Wildlife Conservation.

Study of the fur industry; the life history and management of the important fur-bearing animals; skinning, drying, marketing pelts, and fur farming. Mr. Stevens.

Courses for Graduates and Advanced Undergraduates

Zool. 401, 402, 403. Applied Entomology. 3-3-3

Prerequisite: Zool. 213. Required of seniors in Entomology.

A detailed study of the relation of insects to human welfare and the principles of insect control; the special study of the more important insects directly or indirectly affecting man; and a special study of methods of investigation. Mr. Mitchell.

Zool. 411, 412. Genetics. 4-4-0

Prerequisite: Bot. 101, 102 or Zool. 101. Fall term required of juniors in Animal Production, Entomology, Field Crops, Floriculture, Pomology, Poultry Science, and Vegetable Gardening; of seniors in Plant Pathology.

Basic principles of heredity and variation. Students carry on and analyze breeding experiments, analyze inheritance in various animals and plants. Mr. Bostian.

Zool. 421, 422, 423. Systematic Zoölogy. 3-3-3

Prerequisite: Zool. 101, 102. Required of juniors in Entomology.

The classification of various groups of animals. Mr. Metcalf, Mr. Mitchell.

Zool. 431, 432. Advanced Physiology. 3-3-0

Prerequisite: Zool. 101, 102, 202. Elective for juniors and seniors.

Special studies in animal physiology with emphasis on fundamental processes involved. Lectures, reports, and conferences to promote an acquaintance with general literature and recent advances; selected exercises and demonstrations to develop experimental technic. Mr. McCutcheon.

Zool. 433. Field Zoölogy. 0-0-4

Prerequisite: Zool. 101 and 213, or 222, 223. Required of juniors in Wildlife Conservation and seniors in Entomology.

The study of the relation between animals and their environment. Frequent excursions to the field will be taken. Mr. Metcalf, Mr. Bostian.

Zool. 441, 442. Histology. 3-3-0

Prerequisite: Zool. 101-102, 202, 222-223. Required of seniors in Entomology.

A study of animal tissues and their preparation. Mr. Harkema.

Zool. 443. Insect Physiology. 0-0-3

Prerequisite: Zool. 202. Elective for juniors and seniors.

Selected reports, demonstrations and discussions to survey the specialized functions of insects. Mr. McCutcheon.

Zool. 451, 452, 453. Wildlife Management. 3-3-3

Prerequisite: Zool. 321-322-323. Required of seniors in Wildlife Conservation.

Study of the foods and feeding habits of the more important groups of wild animals. Field and laboratory studies of wildlife management and research, and the economic relations of game, predatory, and fur-bearing animals. Mr. Stevens.

Zool. 461. Vertebrate Embryology. 5-0-0

Prerequisite: Zool. 101, 102. Required of juniors in Poultry Science, and seniors in Entomology.

The comparative embryology of the principal groups of vertebrates, with special emphasis on the chick. Mr. Harkema.

Zool. 462, 463. Advanced Animal Ecology. 0-3-3

Prerequisite: Zool. 433. Required of seniors in Wildlife Conservation.

A course devoted to animal geography and the factors which influence the distribution of animals. Mr. Metcalf.

Zool. 471, 472, 473. Advanced Wildlife Management. 3-3-3

Prerequisite: Concurrently with or preceded by Zool. 321, 322, 323. Elective for seniors in Wildlife Conservation.

An assigned problem to be planned and worked out by the student. A term paper covering the procedure. Mr. Stevens.

Zool. 481, 482, 483. Advanced Food Habits Problems. 3-3-3

Prerequisite: Concurrently with or preceded by Zool. 451-452-453. Elective for seniors in Wildlife Conservation.

Assigned or selected problem dealing with the foods and feeding habits of one species of wild animal or a group of similar wild animals. Mr. Stevens.

Zool. 492, 493. Parasitology. 0-3-3

Prerequisite: Zool. 101, 102, 222, 223. Required of seniors in Wildlife Conservation.

A study of the structures, life-cycles and control of animal parasites. Mr. Harkema.

Courses for Graduates Only

Zool. 501, 502, 503. Systematic Entomology. 3-3-3

Prerequisite: Zool. 421, 422, 423.

Codes of nomenclature, methods of writing descriptions, constructing keys, determining priority, selecting and preserving types, and making bibliographies and indexes. Mr. Metcalf, Mr. Mitchell.

Zool. 511, 512, 513. Research in Zoölogy. 3-3-3

Prerequisite: Eighteen term credits in Zoölogy.

Problems in development, life history, morphology, physiology, ecology, genetics, game, management, taxonomy, or parasitology.

Messrs. Metcalf, Meacham, Mitchell, Bostian, McCutcheon, Harkema, Stevens.

Zool. 521, 522, 523. Seminar. 1-1-1

Prerequisite: Eighteen term credits in Zoölogy. Mr. Metcalf.

Zool. 533. Advanced Genetics. 0-0-3

Prerequisite: Zool. 411, 412.

An advanced study of heredity and variation, including biometry. The student will select a problem in breeding to be carried out as a part of the course. Mr. Bostian.

V. SUMMARY OF ENROLLMENT

1938-1939*

1. Resident Students		
A. Candidates for Degrees		
1. Freshmen	861	
2. Sophomores	531	
3. Juniors	435	
4. Seniors	310	
5. Graduates	110	
6. Candidates for Professional Degrees	7	
Total	2,254	
B. Irregular Students		
†1. Extension Classes in Raleigh and Cary	222	
2. Special Students	16	
Total	238	2,492
2. Non-resident Students		
A. Correspondence Students for College Credit	1,277	
B. Extension Students (Classes outside Raleigh)	1,132	
C. Correspondence Students in Practical Courses, no credit	31	
Total	2,440	4,932
3. Summer School Students, 1938		
A. Regular Students		
1. Six weeks	654	
2. Three Weeks	115	
3. Ten Weeks	26	
B. C. C. C. Educational Advisers (Two weeks)	23	
C. Cotton Classing Students, no credit	13	
Total	831	5,763
4. Short Courses and Special Conferences		
1. Institute for Surveyors (three days)	40	
2. Institute for Engineers (one day)	30	
3. Short Course for Sanitarians (three days)	154	
4. Water Plant Operators (five days)	31	
5. Institute, Electrical Meters and Relays (three days)	73	
6. Institute, Plumbing and Heating Contractors (two days)	101	
7. Institute for Street Superintendents (two days)	33	
8. Short Course for Photographers (five days)	10	

* Does not include Spring Term, 1938-1939.
† Data from January, 1938, to January, 1939.

9. Coal Dealers Conference (three days)	179	
10. Institute for Electrical Contractors (three days)	92	
11. Institute for Gas Plant Operators (two days)	78	
12. Nurserymen (three days)	24	
13. Tobacco Growers Short Course (four days)	82	
14. Agricultural Teachers (one week)	301	
15. Farm Boys and Girls (one week)	884	
16. Farm Men and Women	1,225	
17. Farm and Home Agents	441	
18. Young Tar Heel Farmers (three days)	547	
Total	4,325	
Grand Total		10,088

*ENROLLMENT BY CURRICULA

Basic Division

Agriculture	192
Education	57
Engineering	330
Textile	78
Total	657

Agriculture and Forestry

Agriculture	109
Agricultural Engineering	29
Agricultural Options	162
Forestry	134
Landscape Architecture	7
Wld. Cons. & Management	12
Special—No Credit	3
Total	456

Science and Business

Industrial Management	2
Total	2

Education

Industrial Arts	36
Agricultural Education	115
Special—No Credit	1
Total	152

Textiles

Chemistry and Dyeing	46
Manufacturing	137
Yarn Manufacturing	2
Weaving and Designing	21
Textile Management	45
Total	251

* Graduate students are classified by departments.

Engineering

Architectural	37
Ceramic	49
Chemical	206
Civil	49
1. Construction Option	31
2. Highway Option	4
3. Sanitary Option	4
Electrical	129
Geological	14
Industrial	43
Mechanical	112
1. Aeronautical Option	62
Special—No Credit	2
Total	742

Graduate

(Counted in Departmental Classification)

Graduate Students in:	
Agriculture	61
Education	13
Engineering	28
Textiles	8
Candidates for Professional Degrees	7
Total	117
Non-classified Auditors	10

VI. DEGREES CONFERRED

Commencement, June 6, 1938

SCHOOL OF AGRICULTURE AND FORESTRY

Bachelors of Science in Departments as Indicated

Agricultural Economics and Rural Sociology

Hodges Swan Boswell
Jay P. Davis, Jr.
*Woodrow Wilson McPherson
William Adolph Shreiber, Jr.
Dampy Lee Simmons

Animal Production

**Austin McDonald Garriss
Victor Johnston Goodman
Roger Wilson Murdoch
*John William Pou
Edwin LaVerne Shore
James Chester Von Canon

Dairy Manufacturing

Louis Murdock Smith, Jr.
*William Charles Thacker

Field Crops and Plant Breeding

Joseph Yates Allen
*James Clinton Frink
Jesse Francis Giles
Lyle Neil Hall
Joseph John Hamlin, Jr.
George Harman Herring
*Ben Plato Jenkins, Jr.
**Paul Junior Lyerly
Jesse Blair Newlin
Van Sharpe Watson, Jr.
Samuel Lonnie Williams

Floriculture

Henry Louis Brake
James Shugart Melton
Whitten Walter Scholtz, Jr.

Forestry

*James Shirley Campbell
William Allan Campbell
Charles Joseph Cheslock
**Wilmer Lynwood Colwell, Jr.
Posie Clyde Conner
Max McMillan Dillingham
Roy Craft Eaker
Julian Wade Farrior
James Hugh Findlay
Graddy Herring Floyd, Jr.
William Lang Foster
Charles Alexander Fox
Billy Griffin
*Phillip Augustus Griffiths
Richard Milton Henry
LaFloyd Hueston Hobbs
Adolph Jenkins Honeycutt, Jr.
Thomas McClaskey Howerton, Jr.
James Lawrence Huff
George Wilson Hunter
Valentine Victor Kareiva
*Howard William Lull
Walter John Marshburn, Jr.
*Jesse Price Moorefield
*Robert McDowell Nelson
Edwin Witman Ryder
**Clarence Binder Shimer
George Elijah Smith, Jr.
Paul William Warlick
Norbert Benjamin Watts
Joseph Atwood Whitman, Jr.
Walter Warren Wooden

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* Honors.
** High honors.

POMOLOGY

Jean Parks Overcash

POULTRY SCIENCE

**Glenn Cooper Alexander
Charles Clifton Pratt

SOILS

*Harold Donald Morris
*Felix Raymer Speer

DEPARTMENT OF EDUCATION

BACHELOR OF SCIENCE

AGRICULTURAL EDUCATION

Hugh Doak Barden
Charles Hobert Beam
Edmund Broadus Browne
William Sykes Butler
James Hall Campbell
Murray John Chappell
Philip Ramseur Elam
Jefferson Hailen Enloe
*Marsden Lee Farrior
William McGee Harper
Larry Odell Hill
Tyree Bennett Holland
*Truman Lewis King
LeRoy Mintz
*Worth Stephen Moore
Woodie M. Osborne
James Leon Patrick
Ray Lewis Pittman
Albert Jesse Smith
Fred Lewis Smith
*Harvey Grant Snipes
Marvin Preston Taylor
Shearin Pleasant Teague
John Cecil Thorne
Joseph Lee Tunnell
Ben Williams
*Murray Boyd Williams
Edward Howell Wilson

HIGH SCHOOL TEACHING

Stephen Acai
Edward T. Berlinski
Cecil John Brownie
Albert Albien Chiemiego, Jr.
William Edward Entwistle
Thomas Jefferson Harper
Marinus Hoek
Wade Thomas Leary
Louis Mark
Rujar John Massa
Fred Francis Mastrolia
Robert Leslie Mayton
**Honoree Wilsie Pierce
Daniel Anthony Piloseno
Edward Silvio Riccardelli
Joseph John Schwerdt, Jr.
Charlie Carmon Stott
Richard Monroe Thompson
George William Weitlauf, Jr.

INDUSTRIAL ARTS

Sobey Franklin Allen
Byron Siler Clapp
Joseph Alexander Renn, Jr.
Farmer Sterling Smith, Jr.

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* Honors.
** High honors.

SCHOOL OF ENGINEERING

BACHELOR OF SCIENCE

ARCHITECTURAL ENGINEERING

Robert Bruce Cauthen
**Eric Goodyear Flannagan, Jr.

CERAMIC ENGINEERING

*John James Amero
*Arthur Dammann
Warden Wallace Gaskins
Charles Dushan King
Addison Maupin

CHEMICAL ENGINEERING

Paul Cameron Blalock, Jr.
*James Garland Bronson
Alton Elias Davis
Richard Lockwood Davis
William Henry DeBoy
John Henry Griffin
Earle Colton Hart, Jr.
*Norman Samuel Hertz
*Walter David Trubek Jacobson
Joseph Leonard Katz
George Roland Killam, Jr.
*Alfred Johnson Lowdermilk, Jr.
*James Edward Moore, Jr.
Leon Stagg Newman
**Charles Royal Parkinson
Thomas Jefferson Rolland, Jr.
Alvin Saltzman
Ephriam Lee Sawyer
*John Frank Seely
**Donald Sener
*Henry Brower Smith, Jr.
William Solomon Terrell, III
Henry V. Waehli

CIVIL ENGINEERING

*Robert Francis Xavier Anton
Macon Moye Dail
William Archie Edwards, Jr.
*Francis Joseph Johnson
Walter Pitts Little
*William Wardlaw Nickels
Marl Ellis Ray
Thomas Wilson Rivers
Howard Staton Wahab
*Lycurgus Barnhill Ward

CIVIL ENGINEERING, CONSTRUCTION OPTION

John Clifton Boney
John William Brown
Ernest Irvin Clancy
James Michael Coleman, Jr.
*Owen Andrew Daly
James Edwin Grantham
Wyatt Milliard Jones, Jr.
Charles Harry Sachaklian
*Everett Sinclair Scott
John Smith, Jr.
Henry Martin von Oesen

CIVIL ENGINEERING, HIGHWAY OPTION

Anthony P. Fabrizi

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* Honors.
** High honors.

ELECTRICAL ENGINEERING

Paul Garvin Bodwell, Jr.
Lester Radcliffe Crane
*Henry Noble Cyrus
Howell Graydon Gwaltney
Aldo Leon Livera
**Joe Thomas Massey
*Hubert Lee Morgan, Jr.
Miles Gorrell Myers, Jr.
Robert Collin Pollock
Robert Edward Ritch
Alfonso Derious Robertson, Jr.
Raymond Charles Snook
Wythe Brevard Weathers
Joe McAdoo Willis
*Charles Lee Woody
*Simon Brown Woolard

INDUSTRIAL ENGINEERING

William Baerthlein
Walter Jefferson Chapman

MECHANICAL ENGINEERING

Arnold Sydney Abrahams
Mortimer Campbell Brennan
**Wilson Hunt Fisher
*Paul Green
Lee Morrow Hinshaw
James Walter Hollis, Jr.
Joe Paul Lorek
Donald Woods McLean
Raymond F. Myers
*Harold Speight Overman, Jr.
*Russell Vernon Powell
Stanley Zeno Seago
William Oswald Truitt
*Leslie Arden Ward
Frank Conder Ziglar

MECHANICAL ENGINEERING

AERONAUTICAL OPTION

*Lewis Harry Abraham
Jack Leet

SCHOOL OF SCIENCE AND BUSINESS

BACHELOR OF SCIENCE

BIOLOGY

Erwin Lenkowsky
Richard Loomis Oliver
Pauline Elizabeth Tilley

CHEMISTRY

Jacob Benton Joyner
Samuel Burns Moss
*Walter Charles Repony

INDUSTRIAL MANAGEMENT

William McGregor Bell
George Ricks Bobbitt, Jr.
Walter Lee Chambers
Norman Carlton Davis
Woodrow Rex Fountain
*James Spencer Fulghum, Jr.
David Layton Gilbert
Robert Cecil Keys, Jr.
Virgil Henry Lane
Kenneth Talmadge Rand
Alton Smith, Jr.
David Roscoe Southerland
*Robert Lee Stallings, Jr.
John Lennon Sullivan
James Alvin Weathers, Jr.

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* Honors.
** High honors.

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DOCTOR OF ENGINEERING

Charles Irvine Burkholder William McKinney Piatt

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TAU BETA PI AWARDS—H. M. Taylor, Sophomore; G. S. Achorn, Freshman.

ASSOCIATED GENERAL CONTRACTORS' AWARD—E. S. Scott.

J. C. STEELE SCHOLARSHIP CUP—Arthur Dammann.

MOLAND-DRYSDALE SCHOLARSHIP CUP—S. R. Millhouse.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS AWARD—V. F. Kasey.

DELTA SIGMA PI KEY—R. L. Stallings

NATIONAL ASSOCIATION OF TEXTILE MANUFACTURERS' MEDAL—W. P. Crawley

SIGMA TAU SIGMA (TEXTILE) AWARD—C. J. Dulin

ORDER OF 30 AND 3 AWARD
P. D. Kaley, Scranton, Pa.

MU BETA PSI
I. O. Thorne, Rahway, N. J.

STATE COLLEGE WOMAN'S CLUB AWARD
Miss Honoree W. Pierce, Apex, N. C.

INTERFRATERNITY COUNCIL SCHOLARSHIP CUP
Kappa Sigma

SIGMA PI ALPHA (LANGUAGES) AWARD
F. J. Johnson, Tampa, Florida

ALUMNI ATHLETIC TROPHY
Eddie Berlinsky, Bloomfield, N. J.

PHI KAPPA PHI SCHOLARSHIP MEDALS
Senior: J. T. Massey, Raleigh, N. C.

Junior: J. C. Pierce, Jr., Grassy Creek, N. C.
Sophomore: A. M. Smith, Elkin, N. C.

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GOETHE MUSEUM AWARD IN GERMAN
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Championship Tournament
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Interstate After-Dinner, Charlotte Extemporizer and Rhett Oratorical Titles at Dixie Championship Tournament
H. R. McSwain, Shelby, N. C.

Appalachian Mountain Titles in Oratory and in After-Dinner Speaking
Harold Zekaria, New York, N. Y.

Appalachian Mountain Title in Extemporaneous Speaking
George Lippard, Winston-Salem, N. C.

Southeastern Championship in After-Dinner Speaking
Harold Zekaria, New York, N. Y.

Ohio Extemporaneous Contest at Grand Eastern Tournament
H. R. McSwain, Shelby, N. C.

Florida Impromptu Contest at Grand Eastern Tournament
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State Titles in Impromptu Speaking and Oratory
Harold Zekaria, New York, N. Y.

N. C. I. F. A. Championship in Impromptu Speaking
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ELECTRICAL ENGINEERING—Ralph Lee Duval, Watha

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OF

NORTH CAROLINA STATE COLLEGE OF
AGRICULTURE AND ENGINEERING

OF THE

UNIVERSITY OF NORTH CAROLINA

1938-1939

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Turner, D. Luther	So. Tex. Mfg.	116 Woodburn Rd.	Greensboro, N. C.
Turner, J. M.	Fr. For.	133 7th, Box 5397	Chadbourn, N. C.
Turner, P. P., Jr.	Fr. Cer. E.	504 5th, Box 5228	Greensboro, N. C.
Turner, S. Whitfield	Jr. M. E.	539 1911, Box 5819	Raleigh, N. C.
Turner, William Lee, Jr.	Fr. E. E.	311 6th, Box 5271	N. Wilkesboro, N. C.
Tutelman, S. C.	Jr. Tex. Mfg.	2804 Hillsboro St.	Philadelphia, Pa.
Tyren, T. T.	Jr. M. E.	525 1911, Box 5805	Durham, N. C.
Tyson, W. G., Jr.	So. Chem. E.	106 Horne St.	Wendell, N. C.
Umstead, W. A.	So. Chem. E.	214 Watauga, Box 5052	Pinetops, N. C.
Underwood, V. H.	Fr. Ag. Ed.	Greenhouse	St. Paul, N. C.
Upton, F. E., Jr.	Fr. M. E.	516 South, Box 5550	Camden, N. C.
Uzzell, A. T., Jr.	So. Ag.	126 7th, Box 5326	Durham, N. C.
Valaer, E. P.	So. Ag.	118 N. Wilmington St.	Washington, D. C.
Vance, F. K.	Fr. E. E.	205 6th, Box 5253	Winston-Salem, N. C.
Vann, I. M., Jr.	Jr. E. E.	2004 Hillsboro St.	Clinton, N. C.
Vanstory, J. H.	So. Ag.	5 Infirmary, Box 5575	Charles, N. C.
Vaughan, B. F.	Fr. Tex. C. and D.	2222 Circle Drive	Raleigh, N. C.
Vaughan, E. S.	Sr. Chem. E.	10 Enterprise St., Box 5065	Washington, N. C.
Vause, R. C.	Fr. Ag. Ed.	202 5th, Box 5214	La Grange, N. C.
Veach, F. J.	Fr. F. C.	306 7th, Box 5572	Thomasville, N. C.
Vinson, S. C.	Jr. Ag. Ed.	2902 Fairground Ave., Box 5455	Dillard, Ga.
Viverette, W. E.	Sr. C. E.	2804 Hillsboro St.	Sharpsburg, N. C.
Wagoner, H. M.	Fr. E. E.	307 6th, Box 5267	Sanford, N. C.
Waidler, F. P., Jr.	Fr. Ind. E.	151 Hawthorne Rd.	Deposit, N. Y.
Waldin, E. L.	Jr. C. E.	1922 Hillsboro St.	Charlotte, N. C.
Waldin, S. M.	Fr. Tex. Mfg.	1922 Hillsboro St.	Charlotte, N. C.
Waldroop, R. F.	Fr. Ag.	Polk Hall	Franklin, N. C.
Walker, C. Elwood	Grad. An. Prod.	Box 5184	Raleigh, N. C.
Walker, Edwin M.	Jr. For.	409 W. Park Drive	Raleigh, N. C.
Walker, F. A.	Jr. Tex. C. and D.	4 Benehan St.	New Bedford, Mass.
Walker, J. H.	Fr. M. E.	409 W. Park Drive	Raleigh, N. C.
Wall, Herbert C.	Fr. Tex. C. and D.	Gymnasium, Box 5367	Benson, N. C.
Wall, Henry L., Jr.	So. Ag. Engr.	2202 Hillsboro St.	Elams, N. C.
Wall, J. R.	So. Tex. Mfg.	127 1911, Box 5727	East Bend, N. C.
Wall, S. M.	Fr. Ag. Engr.	257 1911, Box 5777	Lilesville, N. C.
Wallace, R. G.	So. M. E.-Aero.	Raleigh, Route 5	Raleigh, N. C.
Waller, D. O., Jr.	So. M. E.	2417 Fairview Rd.	Durham, N. C.
Walsh, Frederick G.	Grad. Ind. Arts	Chapel Hill	Waverly, N. Y.
Walsh, Francis H., Jr.	Jr. Chem. E.	4 Benehan St.	New Bedford, Mass.
Walton, W. L.	Fr. Ag. Engr.	Raleigh, Route 1	Raleigh, N. C.
Ward, C. B.	Fr. Ag.	9 South, Box 5605	Bladenboro, N. C.
Ward, W. J.	Fr. Ag. Ec.	105 Chamberlain St.	Belhaven, N. C.
Warlick, R. D.	Fr. Ag. Ed.	132 South, Box 5552	Lawndale, N. C.
Warner, H. P.	Jr. Tex. Mfg.	30 Shepherd St.	Raleigh, N. C.
Warren, B. William, Jr.	Fr. Chem. E.	5 South, Box 5601	Asheville, N. C.
Warren, J. Wendell	Fr. M. E.-Aero.	Clark Ave., Route 6	Winston-Salem, N. C.

Name	*Classification*	*School Address*	*Home Address*
Warrick, W. C., Jr.	So. Ag. Engr.	103 7th, Box 3303	Clayton, N. C.
Waters, J. M., Jr.	Fr. M. E.	Fieldhouse	Wilson, N. C.
Watkins, C. K.	Jr. Ag.	17 Enterprise St.	Blanch, N. C.
Watkins, G. H.	Fr. M. E.-Aero.	111 E. North St.	Wentworth, N. C.
Watkins, P. E.	Fr. Ag.	320 South, Box 3584	E. Durham, N. C.
Watson, A. B.	So. M. E.-Aero.	1415 Hillsboro St.	Fayetteville, N. C.
Watson, C. K.	Jr. Tex. Mfg.	120 1911, Box 3720	Red Springs, N. C.
Watson, G. Isreal	So. Ag.	314 1911, Box 3794	Lake Landing, N. C.
Watson, Ivey, Jr.	Jr. M. E.	302 Horne St.	Enfield, N. C.
Watson, Malcolm E.	Jr. E. E.	315 1911, Box 3795	Winston-Salem, N. C.
Watson, O. F.	So. Ag. Engr.	315 1911, Box 3795	Winston-Salem, N. C.
Watson, R. Saunders, Jr.	So. Ag.	330 1911, Box 3810	Swan Quarter, N. C.
Watson, Samuel McIver, Jr.	Grad. Chem. E.	2302 Hillsboro St.	Sanford, N. C.
Watson, V. Sharpe, Jr.	Grad. F. C.	231 1911, Box 3771	Rocky Mount, N. C.
Watson, W. H.	Fr. E. E.		Selma, N. C.
Watters, J. V.	So. For.	2405 Clark Ave.	Bridgeport, Pa.
Watts, C. Huron	Fr. Ag. Ed.	228 1911, Box 3768	Harmony, N. C.
Watts, R. Harold, Jr.	So. Tex. Mfg.	2513 Clark Ave.	Baldwin, N. Y.
Waugh, C. M.	Jr. Ag.	233 1911, Box 3773	N. Wilkesboro, N. C.
Wayant, J. E.	Jr. Tex. Mgt.	103 Chamberlain St.	Asheville, N. C.
Waynick, D. T.	Jr. M. E.	101 1911, Box 3701	Greensboro, N. C.
Weant, G. E., Jr.	Jr. M. E.	2405 Clark Ave.	Salisbury, N. C.
Weathers, J. A.	Grad. Tex. Mgt.	106 Dupont Circle	Raleigh, N. C.
Weaver, D. S.	Fr. Chem. E.	520 Daughtridge St.	Raleigh, N. C.
Weaver, F. D., Jr.	So. Chem. E.	125 1911, Box 3725	Wilmington, N. C.
Webb, Fred A., Jr.	Jr. Ind. Arts	407 Chamberlain St.	Raleigh, N. C.
Webb, J. Fred, Jr.	Sr. F. C.	208 1911, Box 3748	Macclesfield, N. C.
Webb, W. B.	Fr. E. E.	606 Gaston St.	Raleigh, N. C.
Weber, C. P.	Jr. Tex. Mfg.	10 Enterprise St.	Glen Rock, N. J.
Webster, Jack A.	Fr. M. E.-Aero.	121 South, Box 3521	Charlotte, N. C.
Webster, John W.	Grad. Pl. Br.		Pylesville, Md.
Weeks, S. J.	So. Ag.	2312 Byrd St.	Raleigh, N. C.
Weisse, F. C.	So. For.	130 1911, Box 3730	New York, N. Y.
Welch, C. D., Jr.	So. Tex. Mfg.	1922 Hillsboro St.	Charlotte, N. C.
Welch, S. B.	So. Tex. Mfg.	1922 Hillsboro St.	Charlotte, N. C.
Welfare, W. F., Jr.	So. Ag.	103 Chamberlain St.	Wilson, N. C.
Wellons, J. A.	So. C. E.	517 Polk St.	Raleigh, N. C.
Wells, C. B., Jr.	So. Ag.	115 Woodburn Rd.	Leicester, N. C.
Wells, D. E.	Fr. M. E.	Y. M. C. A.	Southport, N. C.
Wells, S. P	So. C. E.	117 Watauga, Box 3017	Rocky Mount, N. C.
Wenige, A. E.	Fr. C. E.	208 6th, Box 3256	Asheville, N. C.
Wesson, W. T.	Jr. Ag. Ec.	111 7th, Box 3311	Elams, N. C.
Westbrook, R. H., Jr.	Fr. M. E.-Aero.	Cameron Park Apt. 12	Raleigh, N. C.
Wester, A. B., Jr.	Jr. Chem. E.	132 7th, Box 3332	Henderson, N. C.
Westerfield, R. L.	Sr. For.	1907 Alexander Rd.	Raleigh, N. C.
Wetmore, E. Hall	Jr. Ag. Ed.	112 Cox Ave.	Woodleaf, N. C.
Wetmore, P. Harrington	So. Ag. Ed.	211 Hawthorne Rd.	Woodleaf, N. C.
Wheatley, C. Heywood	So. Arch. E.	3 Gymnasium, Box	Wilmington, N. C.
Wheatley, R. H.	Sr. C. E.	116 Groveland Ave.	Wilmington, N. C.
Wheeler, G. J.	Fr. Ag.	1004 W. South St.	Louisburg, N. C.
Wheeler, M. H.	So. E. E.	115 1911, Box 3715	Benson, N. C.
Whitaker, J. O.	So. Ag.	124 1911, Box 3724	Horse Shoe, N. C.
Whitaker, L. W.	Fr. E. E.	Garner	Garner, N. C.
White, F. Boyd, Jr.	Fr. Tex. Mfg.	325 7th, Box 3391	Lenoir, N. C.
White, H. John	Fr. M. E.	311 6th, Box 3271	Little Neck, N. Y.
White, Jack D.	Fr. Ag. Ed.	918 New Bern Ave.	Evergreen, N. C.
White, Joseph Edward, Jr.	Fr. M. E.	314 7th, Box 3380	Oak Hill, W. Va.
White, Julian Elder, Jr.	Fr. Dairy Mfg.	309 W. Edenton St.	Raleigh, N. C.
White, James M.	Fr. Ag.	105 5th, Box 3205	Maxton, N. C.
White, Nat Boyd	Fr. Ag.	2308 Hillsboro St.	Manson, N. C.
White, R. Nuell	Jr. Ag.	123 Brooks Ave.	Winston-Salem, N. C.
Whitehouse, J. H.	Fr. M. E.-Aero.	118 Forest Rd.	Springfield, Mass.
Whitfield, L. E., Jr.	Jr. M. E.	114 1911, Box 3714	Asheboro, N. C.

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Whitley, H. Stuart	Sr. Arch E.	223 1911, Box 3763	Williamston, N. C.
Whitley, M. Ray	So. E. E.	2804 Hillsboro St.	Washington, N. C.
Whitley, Robert W.	Grad. Soils	104 Logan Court	Raeford, N. C.
Whitley, Sam D.	Fr. Ag.	211 6th, Box 3259	Matthews, N. C.
Whitmire, E. J.	Sr Ag. Ed.	118 1911, Box 3718	Brevard, N. C.
Whitmire, H. F.	So. Ind. E.	1806 Hillsboro St.	Norton, Va.
Whitsett, J. G.	Fr. E. E.	228 1911, Box 3768	Whitsett, N. C.
Whitson, Charles	So. M. E.-Aero.	227 7th, Box 3359	Asheville, N. C.
Whitson, W. K.	Sr. Chem. E.	334 1911, Box 3814	Asheville, N. C.
Whitted, D. R.	So. E. E.	115 1911, Box 3715	Elizabethtown, N. C.
Whittington, C. W.	Fr. Chem. E.	509 Cutler St.	Snow Hill, N. C.
Wicker, E. John	Sr. M. E.	113 Seawell Ave.	Raleigh, N. C.
Wicker, June S.	So. W. C. and M.	2202 Hillsboro St.	Sanford, N. C.
Wicker, R. L.	Jr. C. E.	1620 Hillsboro St.	Sanford, N. C.
Widlitz, Charles	Sr. Tex. Mfg.	201 7th, Box 3333	Rockville Center, N.Y.
Wiggin, N. K.	Fr. Tex. Mfg.	326 South, Box 3590	Manoa, Pa.
Wiggins, J. E., Jr.	So. For.	2220 Hillsboro St.	Sunbury, N. C.
Wilburn, J. M., Jr.	So. Ag. Ed.	Raleigh, Route 5	Raleigh, N. C.
Wilder, C. A.	Fr. Ag. Ed.	918 New Bern Ave.	Carthage, N. C.
Wilder, H. P.	Sr. E. E.	8 Maiden Lane	Aberdeen, N. C.
Wilfong, J. J.	Fr. Ag.	212 South, Box 3544	Newton, N. C.
Wilkerson, H. D.	So. E. E.	214 7th, Box 3346	Wilson, N. C.
Wilkinson, J. W.	Jr. E. E.	230 1911, Box 3770	Burnside, Ky.
Willey, D. A., Jr.	Jr. Ag. Ed.	202 1911, Box 3742	Gates, N. C.
Willey, J. F.	Jr. Ag. Ed.	202 1911, Box 3742	Gates, N. C.
Williams, Albert Lee	So. Ag. Ed.	134 Woodburn Rd.	Linwood, N. C.
Williams, Arthur Robinson	Jr. Tex. C. and D.	206 Watauga, Box 3024	Greensboro, N. C.
Williams, Effron Avery, Jr.	Jr. Cer. E.	109 Watauga, Box 3009	Swan Quarter, N. C.
Williams, Frank Draughn	Fr. For.	303 5th, Box 3227	Rocky Mount, N. C.
Williams, Gerald White	Fr. E. E.	110 5th, Box 3210	Maysville, N. C.
Williams, James Edwin	So. Tex. Mfg.	2314 Hillsboro St.	Washington, N. C.
Williams, John Gilmer	Jr. M. E.	115 Park Ave., Box 5102	Warrenton, N. C.
Williams, John Ronald	Jr. C. E.	115 Woodburn Rd.	Arlington, Va.
Williams, L. C., Jr.	Fr. E. E.	211 Hawthorne Rd.	Salisbury, N. C.
Williams, Leon Franklin, Jr.	Jr. M. E.	1816 Park Drive	Raleigh, N. C.
Williams, Lewis Harris	Fr. M. E.-Aero.	1913 McCarthy St.	Raleigh, N. C.
Williams, Ralph Benjamin	So. Chem E.	115 Park Ave.	Warrenton, N. C.
Williams, Sydney Ray	Jr. E. E.	210 Woodburn Rd.	Essex, N. C.
Williams, Troy Durant	Jr. Chem. E	302 4th, Box 3128	Winston-Salem, N. C.
Williams, Thomas McDowell	So. Chem. E.	405 Calvin Rd.	Raleigh, N. C.
Williams, Walter Pender	Fr. M. E.	2615 Lochmore Drive	Raleigh, N. C.
Williams, Willie Stevenson, Jr.	Fr. Tex. Mfg.	130 South, Box 3530	Middlesex, N. C.
Willis, F. H.	Fr. Ind. E	2512 Stafford Ave.	Stamford, Conn.
Willis, J. W.	So. E. E.	220 Cox Ave.	Memphis, Tenn.
Wilson, Ed. Holt	Fr. M. E.	202 6th, Box 3250	Dunn, N. C.
Wilson, George Higgins	Sr. Chem. E.	College Ct. Apt. 1	Shelby, N. C.
Wilson, George William, Jr.	Fr. Ag.	109 5th, Box 3209	Danville, Va.
Wilson, Henry N.	Fr. E. E.	24 South, Box 3620	Hallsboro, N. C.
Wilson, Robert M.	Grad. For.	2404 Everett Ave., Box 5001	Raleigh, N. C.
Wilson, Royal Whitford	Fr. Ag. Ed.	129 South, Box 3529	Clinton, N. C.
Wilson, Spencer L.	So. For.	115 Woodburn Rd.	Arlington, Va.
Wilson, T. Edwin	Fr. For.	2404 Everette Ave.	Charlotte, N. C.
Wilson, William Sidney	So. M. E.-Aero.	214 Park Ave.	Yanceyville, N. C.
Windham, J. C.	Fr. Yarn Mfg.	129 South, Box 3259	Gastonia, N. C.
Windley, W. D.	So. M. E.	9 Fieldhouse, Box 5613	Belhaven, N. C.
Winiarski, L. J.	Jr. Tex. C. and D.	4 Benehan St.	New Bedford, Mass.
Winstead, R. C.	Fr. For.	313 Watauga, Box 3049	Semora, N. C.
Witherington, R. H.	Jr. W. C. and M.	2209½ Hope St.	Winston-Salem, N. C.
Withers, J. S.	Fr. E. E.	2306 Hillsboro St.	Asheville, N. C.
Withrow, E. J.	So. Ag. Ed.	Chapel Hill	Forest City, N. C.
Witten, A. E.	Fr. C. E.	211 Woodburn Rd.	Gastonia, N. C.

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Woltz, W. G.	Sr. F. C.	2212 Hope St.	Bullock, N. C.
Womble, D. A.	Fr. Ind. E.	236 S. Boylan Ave.	Raleigh, N. C.
Womble, James B., Jr.	Fr. Cer. E.	108 6th, Box 3244	Ashley Heights, N. C.
Womble, John W.	Jr. Chem. E.	306 Watauga, Box 3042	Greensboro, N. C.
Wommack, K. L.	Fr. M. E.	103 4th, Box 3113	Winston-Salem, N. C.
Wood, Paul Emerson	Sr. Tex. Mgt.	201 7th, Box 3333	Hawthorne, N. J.
Wood, Robert B.	Sr. Tex. Mfg.	109 South, Box 3509	Gastonia, N. C.
Wood, Robert Eugene	Fr. Tex. Mfg.	125 Chamberlain St., Box 5204	Fries, Va.
Woodall, H. C., Jr.	So. Tex. Mfg.	101 Watauga, Box 3001	Smithfield, N. C.
Woodard, C. L.	Fr. E. E.		Goldsboro, N. C.
Wooden, W. W.	Grad. For.	1709 Hillsboro St.	Baltimore, Md.
Woodhouse, C. B.	So. C. E.	213 Woodburn Rd.	Elizabethtown, N. C.
Woodhouse, W. W., Jr.	Grad. Ag.	113½ N. Boylan Ave.	Raleigh, N. C.
Woodley, P. S.	Jr. C. E.	10 Enterprise St., Box 5065	Creswell, N. C.
Woodruff, M. William	Sr. E. *B.*	6 Ferndell Lane	Roselle Park, N. J.
Woodruff, P. Wilson, Jr.	Sr. Chem. E.	310 W. Edenton St.	Raleigh, N. C.
Woody, C. M.	Fr. For.	8 South, Box 3604	Estatoe, N. C.
Wooten, Edward Franklin	Fr. E. E.	14 Maiden Lane	Wilson, N. C.
Wooten, Francis Lakey, Jr.	Fr. Chem. E.	325 7th, Box 3391	Winston-Salem, N. C.
Wooten, Louis Ernest, Jr.	Jr. C. E.	311 West Park Drive	Raleigh, N. C.
Wooten, T. M.	So. Ag.	218 7th, Box 3350	Greenville, N. C.
Worrell, James A.	Sr. E. E.	302 4th, Box 3128	Rich Square, N. C.
Worrell, John M.	Sr. Ag. Ed.	118 1911, Box 3718	Gates, N. C.
Worsley, O. C.	Fr. C. E.	332 South, Box 3596	Charlotte, N. C.
Wrenn, O. Z., Jr.	Fr. Chem. E.	209 Woodburn Rd.	Durham, N. C.
Wrenn, R. W.	Sr. Chem. E.	220½ Cox Ave.	Raleigh, N. C.
Wright, Charles L.	Fr. M. E.	330 South, Box 3594	Washington, N. C.
Wright, Chester N.	Sr. For.	336 1911, Box 3816	Highlands, N. C.
Wright, E. K., Jr.	So. Ind. E.	8 Maiden Lane	Wilson, N. C.
Wright, G Hudson	Fr. M. E.	17 South, Box 3613	Laurinburg, N. C.
Wright, Hugh D.	So. Tex. Mfg.	106 1911, Box 3706	High Point, N. C.
Wright, L. Calvin	So. Chem. E.	2306 Hillsboro St.	Asheville, N. C.
Wyatt, John	Fr. E. E.	20 Bagwell Ave.	Hobgood, N. C.
Wyman, F. H.	So. M. E.	104 1911, Box 3704	Franklin, N. C.
Yacko, E. M.	Sr. Chem. E.	2008 Hillsboro St.	Bridgeport, Conn.
Yancey, W. A.	Fr. E. E.	216 E. Peace St.	Raleigh, N. C.
Yates, F. B.	Jr. W. C. and M.	240 1911, Box 3780	Chadbourn, N. C.
Yates, J. E.	Grad. Chem. E.	2220 Hillsboro St.	Stoney Point, N. C.
Yeager, P. B.	Sr. For.	335 1911, Box 3815	Mount Union, Pa.
Yingling, G. L., Jr.	Jr. E. E.	1408 Hillsboro St.	Salisbury, N. C.
York, B. M.	So. Arch. E.	2513 Clark Ave.	Raleigh, N. C.
Young, A. H.	Grad. Ind. Arts	314 E. Park Drive	Raleigh, N. C.
Young, E. O.	Jr. E. E.	340 1911, Box 3820	Oxford, N C.
Young, Monte M.	Sr. For.	Box 5463	Charlotte, N. C.
Yount, G. E.	Sr. C. E.	102 1911, Box 3702	Newton, N. C.
Zabawsky, Zeno	So. Chem. E.	8 Ferndell Lane	Freehold, N. J.
Zachary, L. P., Jr.	Fr. Chem. E.	2708 Vanderbilt Ave.	Taylorsville, N. C
Zande, Albert	Fr. For.	210 South, Box 3542	Asheville, N. C.
Zehner, R. F.	Fr. Ag.	1715 Vanderbilt Ave.	Reading, Pa.
Zerilli, F. J.	Jr. M. E.-Aero.	313 1911, Box 3793	Brooklyn, N. Y.
Zuckerman, J. H.	Fr. M. E.	204 4th, Box 3122	Durham, N. C.